

# LONDON- WEST MIDLANDS ENVIRONMENTAL STATEMENT

Volume 5 | Technical Appendices

CFA15 | Greatworth to Lower Boddington

**Survey reports (CH-004-015)**

Cultural heritage

November 2013

ES 3.5.2.15.7

# **LONDON-WEST MIDLANDS ENVIRONMENTAL STATEMENT**

**Volume 5 | Technical Appendices**

**CFA15 | Greatworth to Lower Boddington**

**Survey reports (CH-004-015)**

**Cultural heritage**



## Department for Transport

High Speed Two (HS2) Limited has been tasked by the Department for Transport (DfT) with managing the delivery of a new national high speed rail network. It is a non-departmental public body wholly owned by the DfT.

A report prepared for High Speed Two (HS2) Limited.

High Speed Two (HS2) Limited,  
Eland House,  
Bressenden Place,  
London SW1E 5DU

Details of how to obtain further copies are available from HS2 Ltd.

Telephone: 020 7944 4908

General email enquiries: [HS2enquiries@hs2.org.uk](mailto:HS2enquiries@hs2.org.uk)

Website: [www.hs2.org.uk](http://www.hs2.org.uk)

High Speed Two (HS2) Limited has actively considered the needs of blind and partially sighted people in accessing this document. The text will be made available in full on the HS2 website. The text may be freely downloaded and translated by individuals or organisations for conversion into other accessible formats. If you have other needs in this regard please contact High Speed Two (HS2) Limited.



Printed in Great Britain on paper  
containing at least 75% recycled fibre.

# Contents

|          |   |           |
|----------|---|-----------|
| <b>1</b> | <b>Introduction</b>                           | <b>1</b>  |
| 1.1      | Structure of the cultural heritage appendices | 1         |
| 1.2      | Surveys undertaken                            | 1         |
| <b>2</b> | <b>Remote sensing survey report</b>           | <b>1</b>  |
| 2.1      | Introduction                                  | 1         |
| 2.2      | Methodology                                   | 1         |
| 2.3      | Limitations                                   | 4         |
| 2.4      | Assumptions                                   | 5         |
| 2.5      | Results: description                          | 5         |
| 2.6      | Results: interpretation                       | 18        |
| 2.7      | Conclusions                                   | 18        |
| 2.8      | References                                    | 19        |
| 2.9      | Historic aerial photographs consulted         | 19        |
| 2.10     | Figures                                       | 20        |
| <b>3</b> | <b>Geophysical surveys</b>                    | <b>21</b> |
| 3.1      | Site OUoAB: Greatworth Hall (GLB213)          | 21        |
| 3.2      | Site OUoAC: Greatworth                        | 22        |
| 3.3      | Site CHoAC: Lower Thorpe Farm (GLB085)        | 23        |
| 3.4      | Site CHoAB: Culworth Grounds (GLB105)         | 25        |
| 3.5      | Site CWoAA: Trafford Bridge (GLB144)          | 27        |
| 3.6      | References                                    | 29        |
| 3.7      | Figures                                       | 29        |
| <b>4</b> | <b>Fieldwalking surveys</b>                   | <b>30</b> |
| 4.1      | Site OUoAB: Greatworth Hall (GLB213)          | 30        |
| 4.2      | Site OUoAC: Greatworth                        | 33        |
| 4.3      | Site CHoAB: Culworth Grounds (GLB105)         | 35        |
| 4.4      | References                                    | 38        |
| 4.5      | Figures                                       | 38        |

## List of tables

|  |    |
|--|----|
| Table 1: Layers used in GIS for digital transcription of archaeological features   | 3  |
| Table 2: Period range abbreviations used in the GIS attribute data   | 4  |
| Table 3: Evidence abbreviations used in the GIS attribute data   | 4  |
| Table 4: Exported GIS attribute data for each transcribed feature, detailing the interpretation applied  | 6  |
| Table 5: English Heritage vertical aerial photographs consulted for the remote sensing survey of the Greatworth to Lower Boddington study area | 19 |

# 1 Introduction

## 1.1 Structure of the cultural heritage appendices

1.1.1 The cultural heritage appendices for the Greatworth to Lower Boddington community forum area (CFA15) comprise:

- baseline reports (Volume 5: Appendix CH-001-015);
- a gazetteer of heritage assets (Volume 5: Appendix CH-002-015);
- an impact assessment table (Volume 5: Appendix CH-003-015); and
- survey reports (this appendix).

1.1.2 Maps referred to throughout the cultural heritage appendices are contained in the Volume 5, Cultural Heritage Map Book.

1.1.3 Where appropriate sites or assets discussed within this report have been cross reference with the gazetteer of heritage assets (Volume 5: Appendix CH-002-015) and can be viewed on Maps CH-01-47b to CH-01-53 in the Volume 5, Cultural Heritage Map Book.

## 1.2 Surveys undertaken

1.2.1 This appendix contains the results of a series of archaeological surveys. These surveys comprised:

- a fully-integrated remote sensing survey incorporating Light Detection and Ranging (LiDAR), hyperspectral imagery and aerial photographic analysis of the majority of the Proposed Scheme;
- geophysical surveys at five locations along the route encompassing approximately 62.1ha (site codes (from south-east to north-west) OUoAB, OUoAC, CHoAC, CHoAB and CWoAA); and
- fieldwalking surveys at three locations along the route encompassing 55.3ha (site codes (from south-east to north-west) OUoAB, OUoAC and CHoAB).

1.2.2 The geophysical survey of site CHoAB also incorporated a metal detecting survey; these are reported on together in Section 3.4 of this report.

### Surveys proposed but not undertaken

1.2.3 Extra to the surveys reported on in this document, a number of additional locations within the Greatworth to Lower Boddington study area were proposed for geophysical survey but due to access or other restrictions these were not carried out. The locations of these proposed surveys are:

- Site CHoAA: near Costow House and at Lower Thorpe (national grid reference: SP 5419 4471);
- Site CWoAC: area south of Trafford Bridge (national grid reference: SP 5210 4757);
- Site CWoAB: Edgcote Roman Villa (a.k.a. Blackgrounds) (national grid reference: SP

5074 4881); and

- LLoAA: area south of Lower Boddington (national grid reference: SP 4660 5300).

# 2 Remote sensing survey report

## 2.1 Introduction

2.1.1 This report outlines the results of the archaeological remote sensing survey of the Greatworth to Lower Boddington community forum area (CFA15). This was an archaeological survey involving the systematic analysis, interpretation, mapping and recording of archaeological sites from aerial photographs, hyperspectral imagery and LiDAR.

2.1.2 The aim of the survey was to map and record the form and extent of archaeological features visible as cropmarks, soilmarks, earthworks or structures on a range of different remote-sensed imagery for the study area, in order to inform the baseline assessment of the cultural heritage resource.

## The study area

2.1.3 The study area for this remote sensing survey covered the entire length of the Greatworth to Lower Boddington study area, which falls entirely within Northamptonshire.

2.1.4 The study area generally comprised a 700m-wide strip centred on the Proposed Scheme (350m either side). This provided a buffer sufficient to offer contextual information for all recorded sites. Where the Proposed Scheme boundary extended beyond the edge of the 700m-wide strip, the study area was expanded to the limit of the remote sensing survey boundary shown in Figures CH-004.08.01 - CH-004.08.09.

2.1.5 In total, archaeological remote sensing survey for the Greatworth to Lower Boddington study area covered an area of 12 km<sup>2</sup>.

## 2.2 Methodology

### Northamptonshire National Mapping Programme

2.2.1 The study area has previously been surveyed as part of the Northamptonshire national mapping programme<sup>1,2</sup>, which was undertaken between 1994 and 2001. It was originally intended that archaeological features already mapped and recorded by the Northamptonshire national mapping programme would not be re-transcribed. In practice, however, the very high resolution LiDAR data available to the current survey, in combination with refined aerial photograph rectification methodologies, meant that it was sometimes possible to record Northamptonshire national mapping programme -documented features with a greater level of detail and accuracy. Where a potential archaeological feature differed significantly in detail, location or extent from the Northamptonshire national mapping programme mapping, it was re-transcribed.

<sup>1</sup> Deegan, A., (1992) *Northamptonshire NMP Project: management report*, English Heritage and Northamptonshire County Council, Unpublished Report.

<sup>2</sup> Deegan, A. and Foard, G., (2007) *Mapping Ancient Landscapes in Northamptonshire*, English Heritage, Swindon.

2.2.2 In order to provide consistency with the Northamptonshire national mapping programme and the other English Heritage national mapping programme mapping, the archaeological remote sensing survey was carried out in broad accordance with the current version of the English Heritage national mapping programme standards<sup>3</sup>. The interpretations applied to identified features are consistent with the preferred terms within the English Heritage Monument Type Thesaurus<sup>4</sup>.

### Sources: modern aerial photographs

2.2.3 High resolution (12.5cm) vertical aerial orthophotography taken specifically for the purposes of the project was made available for this survey. This imagery was captured during 2012. It generally consists of a 700m-wide strip centred on the proposed route, although it is slightly wider in some areas. It was viewed digitally within a geographical information system (GIS) program. The level of accuracy of the orthorectification is such that features mapped from this source should be within 15cm of true ground position.

2.2.4 Pre-existing vertical aerial orthophotography dating from the 1990s and 2000s was also made available for this survey. This was supplied under the Pan-Government Agreement. The resolution is 25cm. The level of accuracy of the orthorectification is such that features mapped from this source should be within 1.5m of true ground position<sup>5</sup>. This vertical imagery was also viewed on-screen within GIS.

### Sources: historic aerial photographs

2.2.5 Searches were made for readily-available historic vertical and oblique aerial photographs held by the English Heritage Archive (formerly the National Monuments Record) and the Cambridge University Unit for Landscape Modelling. The latter is also referred to as the Cambridge University Collection of Aerial Photography.

2.2.6 To avoid unnecessary duplication, archival aerial photographs used in the Northamptonshire national mapping programme were not re-examined in the course of the present survey. This significantly reduced the number of aerial photographs included, as follows:

- none of the 442 historic vertical aerial photographs of the study area in the English Heritage Archive post-date the Northamptonshire national mapping programme;
- seventy-one of the 232 historic oblique aerial photographs of the study area in the English Heritage Archive post-date the Northamptonshire national mapping programme and were therefore examined as part of the current survey (see Table 5);
- none of the 22 historic vertical and oblique aerial photographs of the study area in the Cambridge University Collection of Aerial Photography archive post-date the Northamptonshire national mapping programme.

2.2.7 The oblique aerial photographs in the English Heritage Archive which were analysed for this study were taken between 2002 and 2011 and usually targeted known sites of architectural or archaeological interest. They were typically taken at a much larger scale than the 'blanket'

vertical aerial photography, and were often timed to capture images of archaeological sites when they were at their most visible, i.e. when dry ground conditions favoured the development of clear cropmarks, or when low winter sun would reveal subtle earthworks.

2.2.8 All aerial photographs utilised by this survey were viewed in person and examined stereoscopically and under magnification where applicable. Copies were obtained where potential archaeological features were identified and the relevant photographs were considered to be of use either for transcription or for reference purposes.

### Sources: LiDAR imagery

2.2.9 High resolution LiDAR data acquired specifically for the purposes of the project was made available for this survey. This data was captured in 2012. It generally consists of a 700m-wide strip centred on the Proposed Scheme, although it is slightly wider in some areas.

2.2.10 The resolution of the data supplied was 20cm. The level of accuracy of the orthorectification was such that features mapped from this source should be within 15cm of true ground position. The raster digital elevation model was viewed directly within GIS. The digital elevation model is LiDAR data that has been processed to provide a representation of the ground surface without objects such as vegetation or buildings. This means that archaeological earthworks can be revealed on the LiDAR imagery, even if they lie beneath areas of woodland<sup>6</sup>.

### Sources: hyperspectral imagery

2.2.11 Hyperspectral imagery taken specifically for the purposes of the project was made available for this survey. This imagery was captured in a series of runs during 2012 and provides a considerable buffer beyond the edge of the remote sensing survey study area boundary<sup>7</sup>.

2.2.12 Thirty-four separate spectral band widths were captured, ranging from 406.075 nanometres to 992.065 nanometres. The band widths varied slightly between 16.280 nanometres at the lower end of the spectrum to 18.280 nanometres<sup>8</sup>. For each of the areas surveyed, varying combinations of three different bandwidths were analysed, with particular reference to bands 7–13 (882.725 nanometres to 773.255 nanometres) and bands 18–22 (683.435 nanometres to 612.185 nanometres), as these have been shown previously to be useful in archaeological remote sensing<sup>9</sup>.

2.2.13 The hyperspectral imagery was viewed directly within GIS, as automated classification software does not work well with such high resolution data due to the prolifically varied response obtained from a single small area<sup>10</sup>.

### Sources: historic environment record (HER) data

2.2.14 Data from the Northamptonshire HER was supplied for the survey. These records were used as a reference to aid interpretation of features visible on remote sensed imagery, either

<sup>3</sup> Winton, H., (2012) *Standards for National Mapping Programme projects, Version 0.1 Draft*, English Heritage, Aerial Investigation and Mapping, Typescript document.

<sup>4</sup> English Heritage; NMR Monument Type Thesaurus; [http://thesaurus.englishheritage.org.uk/thesaurus.asp?thes\\_no=1](http://thesaurus.englishheritage.org.uk/thesaurus.asp?thes_no=1); Accessed: August 2012–June 2013.

<sup>5</sup> GeoStore; Aerial Photography RGB Product; <http://www.geostore.com/geostore4/WebStore?xml=geostore4/xml/productsAPRGB.xml>; Accessed August 2013.

<sup>6</sup> This can sometimes depend upon the time of year that the LiDAR imagery was captured.

<sup>7</sup> CFA15 was covered by hyperspectral runs 19c, 20a, 20b, and 21b.

<sup>8</sup> Blom (2012), HS2 Hyperspectral Information, BLOM Project Number: 03/037/12.

<sup>9</sup> Powlesland, D., Lyall, J. and Donoghue, D., (1997), *Enhancing the record through remote sensing: the application and integration of multi-sensor, non-invasive remote sensing techniques for the enhancement of the Sites and Monuments Record*, Internet Archaeology 2; <http://dx.doi.org/10.11141/ia.2.4>; Accessed: 18/12/2012.

<sup>10</sup> Powlesland, D., Lyall, J. and Donoghue, D. (1997).

through a pre-existing identification of a visible feature, or by providing information that could help characterise the likely cultural heritage resource of the area.

2.2.15 The HER data was supplied as points, lines and polygons, with identifying attribute data attached. Full monument record reports were also supplied as a portable document format document. The data supplied covered the entirety of the Northamptonshire HER area, creating an ample buffer to provide contextual information for any archaeological sites of interest within the boundary of the remote sensing study area.

**Sources: National Record of the Historic Environment data**

2.2.16 Monument data from the national record of the historic environment, held by English Heritage, was supplied for the survey. This data was used as a reference to aid interpretation of features visible on remote sensed imagery either through a pre-existing identification of a visible feature or by providing information that could help characterise the likely cultural heritage resource of the area.

2.2.17 This data was supplied as points, lines and polygons with identifying attribute data attached. Full monument record reports were also supplied as a PDF document. The data covered a 10km-wide strip (5km each side of the Proposed Scheme centre line) thereby providing an ample buffer beyond the boundary of the remote sensing study area.

**Sources: cartographic sources**

2.2.18 Historic Ordnance Survey (OS) mapping was supplied for the survey. The map tiles had been geo-referenced and were viewed digitally in GIS. Epochs 1–4 of the 1:2500 scale County Series maps, which typically date from 1898 onwards, were used as a reference to aid interpretation of features visible on the remote sensed imagery.

2.2.19 In general, where features such as field boundaries, trackways, extractive pits or ponds were marked on a historic OS map, they were not mapped and recorded as part of this survey. This is because the objective of this project was to add to the known record, not duplicate it. Nevertheless where the full extent or form of a feature was not recorded in its entirety on the historic maps it was included in the transcription for this project.

**Interpretation, rectification and mapping**

2.2.20 All vertical and oblique images from the sources identified above were systematically examined for any archaeological features visible as cropmarks, soilmarks, earthworks or structures. In accordance with best practice for remote sensing surveys, all available sources for each field or land parcel were viewed in conjunction in order to enable the most accurate interpretation possible.

2.2.21 Where archaeological features were visible on the LiDAR or aerial orthophotography, a detailed transcription, including all visible elements of the site in question, was carried out in ArcMap 10.1.

2.2.22 Where additional sites, features or details were visible on the historic aerial photographs from the English Heritage Archive, these images were rectified using the computer program Aerial 5.33 prior to their import into ArcMap for transcription.

2.2.23 Digital OS MasterMap 1:1250 base maps were used to establish control points (it should be noted that even when 1:1250 scale data is obtained, the scale of the mapping for rural areas is

only in fact 1:2500<sup>11</sup>). Six or more control points were used for each photograph, with errors kept below 1m for each control point. This provided an accuracy of less than 1m to the base map for the rectified photographs.

2.2.24 A Digital Terrain Model (DTM) in the form of 5m point data was used in order to further refine the accuracy of the rectifications.

2.2.25 The OS advise that their 1:1250 scale MasterMap data has an accuracy of 0.5m root mean square error for urban areas, and 1.1m root mean square error for rural areas<sup>12</sup>. Therefore archaeological features transcribed from photographs rectified using this data will on average be accurate to within 1m–2m of their British national grid coordinates.

2.2.26 As noted above, in order to ensure consistency with other similar remote sensing datasets, this project was carried out in broad accordance with current national mapping programme standards and guidance. As such, the identified features were transcribed onto the standard national mapping programme drawing layers, using standard national mapping programme conventions<sup>13</sup> as detailed in Table 1.

Table 1: Layers used in GIS for digital transcription of archaeological features<sup>14</sup>

| Layer name                        | Colour    | Description  |
|-----------------------------------|-----------|--|
| Bank                              | Red       | Defines the outline of positive features such as boundary banks or windmill mounds. Thin banks, or those too diffuse to define accurately are included on this layer as a single line.                                   |
| Ditch                             | Green     | Defines the outline of negative features such as boundary ditches or hollow ways. Thin ditches, or those too diffuse to define accurately are included on this layer as a single line.                                   |
| Large cut feature                 | Blue      | Defines the outline of sizeable negative features such as quarries or extractive pits.   |
| Levelled R&F outline or direction | Magenta   | Defines the outline of a single block of ridge and furrow (R&F) seen either as a cropmark, or an earthwork later known to have been levelled.<br>An arrow within each single block indicates the direction of ploughing. |
| Extant R&F outline or direction   | Cyan      | Defines the outline of a single block of ridge and furrow seen as earthworks on the latest available remote sensed imagery.<br>An arrow within each single block indicates the direction of ploughing.                   |
| Extent of area                    | Grey      | Defines the extent of large features such as the perimeters of World War II airfields and military camps.  |
| T-hachure                         | Dark blue | Top of the 'T' defines the top of a slope or scarp edge such as a lynchett or house platform. Body of the 'T' indicates the length and direction of the slope.   |
| Structure                         | Purple    | Defines the extent of surviving buildings and structures such as individual World War II Nissen Huts and pillboxes. Thin structures such as walls or concrete paths are included in this layer as a single line.         |

<sup>11</sup> Ordnance Survey; Products and Services FAQs: How accurate are your products?; <http://www.ordnancesurvey.co.uk/oswebsite/support/products-services.html>; Accessed: June 2013.

<sup>12</sup> Ordnance Survey; Products and Services FAQs: How accurate are your products?; <http://www.ordnancesurvey.co.uk/oswebsite/support/products-services.html>; Accessed: June 2013

<sup>13</sup> Winton, H., (2012).

<sup>14</sup> Table 1 based on Winton, H., (2012), Section 7.5. P31.

2.2.27 Table 2 and Table 3 show period range and evidence range abbreviations used. The evidence abbreviations identify the form in which a feature is visible on the remote sensed imagery.

2.2.28 Information relating to each of the transcribed features was recorded in the ArcMap attribute table. This included details such as the interpretation of each feature and the remote sensed source they were transcribed from, as well as the HER and national record of the historic environment numbers for the features if applicable. These results have been set out in Table 4 of this survey report.

Table 2: Period range abbreviations used in the GIS attribute data

| Period                   | Abbreviation | Date range       |
|--------------------------|--------------|------------------|
| Neolithic                | N            | 4,000 – 2,400 BC |
| Bronze Age               | BA           | 2,400 – 700 BC   |
| Iron Age                 | IA           | 700 BC – AD 43   |
| Roman                    | RO           | AD 43 – 410      |
| Early medieval           | EM           | AD 410 – 1066    |
| Medieval                 | MD           | AD 1066 – 1540   |
| Post-medieval            | PM           | AD 1540 to 1901  |
| 20 <sup>th</sup> century | C20          | AD 1901 – 2000   |
| World War II             | WWII         | 1939 to 1945     |
| Uncertain                | UN           |                  |

Table 3: Evidence abbreviations used in the GIS attribute data

| Evidence                                | Abbreviation |
|---|--------------|
| Cropmark (includes soilmarks)           | C            |
| Earthwork                               | E            |
| Levelled earthwork                      | LE           |
| Destroyed monument (i.e. quarried-away) | DM           |
| Structure                               | S            |

2.2.29 The results of this remote sensing survey and transcription have been saved in the project ArcMap MXD with all of the additional required metadata attached. The results have also been exported as Esri shapefiles for ease of import into other GIS programs where necessary in compiling the baseline survey.

## 2.3 Limitations

2.3.1 Hyperspectral imagery of the south-eastern end of the Proposed Scheme had not been taken at the time of this survey. It was therefore only available for the two northernmost vent shaft locations within the study area.

2.3.2 In some areas, the 2012 LiDAR and aerial orthophotography did not cover the full extent of the Proposed Scheme.

2.3.3 Where archaeological sites have been identified solely from remote sensed imagery, without confirmation from archaeological excavation or supporting evidence in the form of find-spots, etc., it should be noted that the interpretation may be revised in the light of further investigation.

2.3.4 It should be stressed that the absence of an archaeological feature on remote sensed imagery does not confirm its absence in the ground, as visibility from the air is sometimes dependent upon a complex combination of factors. These include:

- unsuitable conditions at the time of image capture (such as lighting, ground moisture content and crops or other ground cover);
- variable quality of photography;
- underlying features being masked by alluvial build-up; and
- areas where archaeological features either do not survive or have never existed.

2.3.5 During the survey, 'steps' of approximately 2m were noted at several points in the purpose-flown 2012 vertical orthophotography, where adjacent image tiles had been joined to provide continuous coverage of the Proposed Scheme..

2.3.6 Archaeological features were not mapped beyond the boundary of the remote sensing survey study area, as the cumulative effect of this along the entire length of the Proposed Scheme would have resulted in a significant increase in the study area. Where archaeological cropmarks, earthworks, soilmarks or structures continued beyond the study area boundary, this was noted in the attribute data of the mapped feature.

2.3.7 The hyperspectral imagery obtained for the purposes of the project did not include spectral bands in the short-wave to mid-infrared/thermal wavelengths (2080 nanometres – 13000 nanometres), which have been shown in the past to be of particular use in assessing archaeological potential. The mid-infrared/thermal range is especially likely to reveal subtle cropmarks or soilmarks that are not strong enough to be detectable in the visible part of the spectrum, due to the fact it will display very slight differences in water content present within both vegetation and the ground<sup>15</sup>.

2.3.8 As noted in Section 2.2.1 of this report, archival aerial photographs consulted as part of the Northamptonshire national mapping programme were not re-examined by the present survey. The Northamptonshire national mapping programme only recorded evidence for medieval or post-medieval ridge and furrow where such evidence coincided with other transcribed archaeological features. It is possible that some of the ridge and furrow

<sup>15</sup> Powlesland, D., Lyall, J. and Donoghue, D. (1997).

|   |  |
|---|--|
| earthworks or cropmarks which went unrecorded by the Northamptonshire national mapping programme are not visible on the post- Northamptonshire national mapping programme sources consulted by the present survey; any such ridge and furrow will not, therefore, have been noted by either survey. It should be noted, however, that the quantity of both extant and levelled ridge and furrow recorded by the present the Greatworth to Lower Boddington study are survey is not significantly lower than that recorded in the other study areas, suggesting that it is unlikely that a significant quantity of former ridge and furrow cultivation has gone unrecorded.                    | letter for each study area. For the Greatworth to Lower Boddington study area it is the letter 'O'.  |
| 2.3.9 Consultation is on-going with Northamptonshire HER regarding any possible historic oblique and vertical aerial photographs held in their archive.   | 2.5.5 The national record of the historic environment and HER columns detail the relevant monument numbers for these authorities, where such numbers exist for transcribed features. The HER reference quoted is the 'Pref Ref' rather than the Monument Number.               |
| 2.4.1 Information on the positional accuracy of the hyperspectral imagery has not been supplied. As such, it is assumed that the accuracy of the orthorectification of this source is at least as good that of the Aerial 5.33 program outlined in Section 2.2.22 of this report (i.e. transcribed features will be accurate to within 1m–2m of true ground position). See the note in Section 2.3.6 of this report regarding the 2m 'steps' observed in some locations.  | 2.5.6 The period abbreviations used are set out in Table 2.  |
| 2.4.2 <b>Assumptions</b>  | 2.5.7 As noted in Section 2.2.2 of this report, the interpretation types (given in the Type column) comply with the preferred terms within the English Heritage Monument Type Thesaurus <sup>18</sup> in order to achieve consistency with other similar transcribed datasets. |
| 2.5.1 The primary output of the archaeological remote sensing survey of the Greatworth to Lower Boddington study area was the detailed digital transcription of each identified potential archaeological feature. Information pertaining to the interpretation of these features is contained within the attribute data of every line and polygon drawn in GIS.   | 2.5.8 The evidence abbreviations refer to the physical nature of the recorded features. These abbreviations are set out in Table 3.  |
| 2.5.2 Table 4 itemises in detail the results of the Greatworth to Lower Boddington study area survey. These details originate from the GIS attribute data. The table should be read in conjunction with Figures CH004.15.01–12 of this report.  | 2.5.9 The remote sensed imagery used to transcribe each individual feature is detailed in the Source column.   |
| 2.5.3 Where a single mapped feature has generated two lines of identical attribute data <sup>16</sup> the duplicate line has been removed from Table 4. Where the transcription of a site or feature consists of several lines or polygons which may have been visible on different sources, or in a different form (i.e. where different elements of the site are visible as both cropmarks and earthworks) the differing lines of the attribute data table have been retained in order to reflect these variations.   | 2.5.10 The description column is intended as a brief interpretation only, outlining the main features or points of note.   |
| 2.5.4 The aerial survey ID is the unique identifier applied to each site or feature transcribed during this project. It was not considered sufficient to use the automatically generated 'feature ID' within GIS, as this would result in a site which consisted of several different features represented by different lines and polygons having several different identifying numbers. The aerial survey ID was also used to group features, such as several interconnecting fields of ridge and furrow. This is consistent with the approach taken by English Heritage on National Mapping Programme projects <sup>17</sup> . The aerial survey ID is prefixed with a different sequential | 2.5.11 The full attribute table attached to every line and polygon transcribed as part of this survey contains additional columns not displayed in Table 4, such as the date the feature was transcribed and the initials of the member of staff responsible.                  |

<sup>16</sup> Such as a block of ridge and furrow, which contains this information within both the polygon that defines its extent and the line indicating the direction of ploughing.

<sup>17</sup> Winton, H. (2012).

<sup>18</sup> English Heritage, *NMR Monument Type Thesaurus*.

Table 4: Exported GIS attribute data for each transcribed feature, detailing the interpretation applied

| Aerial Survey ID | National record of the historic environment | HER                      | Period  | Type                             | Evidence | Source  | Description  |
|------------------|---|--------------------------|---------|----------------------------------|----------|---|--|
| Oo1<br>(GLB008)  | N/A   | 9889/o/2                 | MD / PM | Ridge and furrow                 | E        | HS2 LiDAR 2012  | A well-preserved field of ridge and furrow is visible on modern LiDAR. South-west corner of field not mapped as it is beyond the project boundary. Previously recorded as part of the Northants Open Fields Project.   |
|                  |   |                          |         |                                  | C        | Pan-Government Agreement SP5740 o2-SEPT-2004                  | Levelled ridge and furrow is very faintly visible as cropmarks in an arable field on a vertical aerial photograph. Continues across the rest of the field to the south-west but not mapped beyond survey boundary.   |
|                  |   |                          |         |                                  | C        | Pan-Government Agreement SP5741 o2-SEPT-2004                  | Levelled ridge and furrow is very faintly visible as soilmarks in a recently-ploughed arable field. Continues across the rest of the field to the south-west but not mapped beyond survey boundary.  |
|                  |   |                          |         |                                  | E / LE   | Pan-Government Agreement SP5641 o2-SEPT-2004 / HS2 LiDAR 2012 | Ridge and furrow faintly extant on aerial photographs of 2004. More strongly visible in centre of field. Appears to be levelled by LiDAR of 2012. Looks like it was originally part of the very well-preserved area of ridge and furrow in field to the south.     |
|                  |   |                          |         |                                  | C        | Pan-Government Agreement SP5740 o2-SEPT-2004                  | Ridge and furrow is visible as cropmarks on a vertical aerial photograph of 2004. Continues into the western end of the field, but not mapped beyond survey boundary.  |
| Oo2              | N/A   | N/A                      | PM / UN | Extractive pit / natural feature | E        | HS2 LiDAR 2012  | A shallow sub-oval depression is visible in an arable field to the south of Halse Copse. Not recorded on historic OS maps. Possible former extractive pit, though it may alternatively be a natural feature such as a doline, as the bedrock is limestone.         |
| Oo3<br>(GLB010)  | N/A<br>N/A                                  | N/A<br>N/A               | MD / PM | Boundary bank                    | E        | HS2 LiDAR 2012  | The irregularly-shaped partially-degraded remains of a former boundary bank are visible on LiDAR beneath the trees. Medieval or post-medieval ridge and furrow also visible on the LiDAR appears to cut through the top of the bank.                               |
|                  |   |                          |         |                                  |          |   | Visible on LiDAR as an earthwork beneath the trees of Halse Copse. Cut by possible ridge and furrow. May have continued to the north-east, though this area is obscured by an extant track marked on the 1st Edition OS map of 1884 as a field boundary.           |
| Oo4              | N/A<br>N/A<br>N/A<br>N/A                    | N/A<br>N/A<br>N/A<br>N/A | MD / PM | Ridge and furrow                 | C        | HS2 Vertical Photography SP5741 2012                          | Ridge and furrow is very faintly visible as cropmarks in this field on modern vertical aerial photographs. Likely to continue across the rest of the field to the north-east, but not mapped beyond survey boundary.   |
|                  |   |                          |         |                                  | E        | HS2 LiDAR 2012  | Ridge and furrow visible on LiDAR as earthworks beneath the trees of Halse Copse. Northernmost two areas most convincing; other areas look rather straight and modern, though they are cut by tracks and boundaries marked on the 1st and 2nd Edition OS maps.     |
|                  |   |                          |         |                                  | E        | HS2 LiDAR 2012  | Two small patches of ridge and furrow are visible as earthworks on LiDAR at the edge of the project area. Likely to continue to the north-east but this is beyond the project boundary so has not been included.   |
|                  |   |                          |         |                                  | E        | HS2 LiDAR 2012  | Two small patches of ridge and furrow are visible as earthworks on LiDAR at the edge of the project area. Likely to continue to the north-east but this is beyond the project boundary so has not been included. This patch lies beneath a small area of woodland. |
| Oo5<br>(GLB215)  | N/A<br>N/A                                  | N/A<br>N/A               | MD / PM | Ridge and furrow                 | E        | HS2 LiDAR 2012  | Possible ridge and furrow is very faintly visible on LiDAR. Very tentative interpretation as the ridges and furrows are significantly wider than other nearby very definite examples, but may be much earlier.   |
|                  |   |                          |         |                                  |          |   | Possible ridge and furrow is very faintly visible on LiDAR. Very tentative interpretation as the ridges and furrows are significantly wider than other nearby very definite examples, but may be much earlier. Similar to Oo8.                                     |
| Oo6<br>(GLB215)  | N/A   | N/A                      | MD / PM | Ridge and furrow                 | E        | HS2 LiDAR 2012  | Ridge and furrow is visible as extant earthworks on modern LiDAR. Likely to continue to the east, but this is beyond both the LiDAR coverage and project boundary.   |
|                  |   |                          |         |                                  |          |   | Well-preserved ridge and furrow is visible as earthworks on LiDAR. Southern corner of the ridge and furrow in this field has been cut by what appears to be a narrow pipeline, probably leading to the covered reservoir just to the west.                         |
| Oo7              | N/A   | N/A                      | MD / PM | Plough headland / boundary bank  | E        | HS2 LiDAR 2012  | A possible ridge and furrow plough headland is visible at the south-east end of a block of ridge and furrow. It can be seen as an extant bank on modern LiDAR.   |

| Aerial Survey ID | National record of the historic environment | HER      | Period  | Type                             | Evidence | Source  | Description  |
|------------------|---|----------|---------|----------------------------------|----------|---|--|
|                  |   | N/A      | MD / PM | Ridge and furrow                 | E / C    | HS2 Vertical Photography SP5642 2012 / HS2 LiDAR 2012 | A probable former field boundary is visible on LiDAR as a very slightly extant bank. Also shows on aerial photographs as a faint light cropmark. Abuts the field of ridge and furrow on its SE side. Parallel to plough direction, so not a plough headland. |
|                  |   | N/A      | MD / PM | Ridge and furrow                 | C        | HS2 Vertical Photography SP5642 2012                  | Ridge and furrow is visible as cropmarks on modern vertical aerial photographs.  |
|                  |   | N/A      | MD / PM | Ridge and furrow                 | C        | HS2 Vertical Photography SP5642 2012                  | Ridge and furrow is visible as cropmarks on modern vertical aerial photographs. It is likely to continue across the rest of the field to the north-east, but this is beyond the project boundary so has not been mapped here.                                |
|                  |   | 9914/0/3 | MD / PM | Ridge and furrow                 | E        | HS2 LiDAR 2012  | Ridge and furrow is visible as extant earthworks on LiDAR.   |
|                  |   | N/A      | MD / PM | Ridge and furrow                 | E        | HS2 LiDAR 2012  | Ridge and furrow is visible as extant earthworks on LiDAR. It is likely that it continues into the north-west corner of the field, but this has not been mapped as it is beyond the edge of both the LiDAR coverage and the project boundary.                |
|                  |   | 9914/0/3 | MD / PM | Ridge and furrow                 | E        | HS2 LiDAR 2012  | Ridge and furrow is visible as extant earthworks on LiDAR. Preservation/survival is patchy - the areas on the south-east side are most clearly visible, whereas some of the areas on the western side are barely visible.                                    |
|                  |   | N/A      | MD / PM | Ridge and furrow                 | E        | HS2 LiDAR 2012  | Ridge and furrow is visible as extant earthworks on LiDAR. This area appears to be within the gardens of Greatworth Hall.  |
| Oo8<br>(GLB216)  | N/A   | N/A      | MD / PM | Ridge and furrow                 | E        | HS2 LiDAR 2012  | Possible ridge and furrow is very faintly visible on LiDAR. Very tentative interpretation as the ridges and furrows are significantly wider than other nearby very definite examples, but may be much earlier. Similar to Oo5.                               |
| Oo9<br>(GLB214)  | N/A   | N/A      | BA / UN | Ring ditch / horse exercise ring | C        | HS2 Vertical Photography SP5642 2012                  | Dark circular cropmark indicates possible ring ditch of Bronze Age date or similar; but a modern explanation such as a horse exercising circle cannot be ruled out. HER includes similar feature nearby from geophysical survey - record 7827/0/1.           |
| O10              | N/A   | N/A      | PM      | Field boundary / boundary ditch  | C        | HS2 Vertical Photography SP5642 2012                  | A probable former field boundary is visible as a linear ditch cropmark on vertical aerial photographs of 2012. Not recorded on the historic OS maps.   |
| O11              | N/A   | N/A      | PM / UN | Extractive pit / natural feature | E        | HS2 LiDAR 2012  | Two large circular and sub-circular depressions are visible on LiDAR of 2012. Not recorded on the historic OS maps. Possible extractive pits. May alternatively be a natural feature such as a doline (underlying bedrock is limestone).                     |
| O12<br>(GLB032)  | N/A   | N/A      | MD / PM | Boundary bank / plough headland  | C        | HS2 Vertical Photography SP5443 2012                  | A former field boundary bank or plough headland is visible on 2012 vertical aerial photographs as a linear bank cropmark. No traces of remaining earthworks are visible on the LiDAR of the same date.   |
|                  |   |          |         | Ridge and furrow                 | E        | HS2 LiDAR 2012  | Ridge and furrow is very faintly visible on LiDAR as extant earthworks in the field to the south of Greatworth Park.   |
|                  |   |          |         | Ridge and furrow                 | E        | HS2 LiDAR 2012  | Ridge and furrow is visible as earthworks on LiDAR in the field immediately north of Astral House. Survival/preservation is patchy.  |
|                  |   |          |         | Ridge and furrow                 | C        | HS2 Vertical Photography SP5543 2012                  | Ridge and furrow is visible on 2012 vertical aerial photographs as cropmarks. No trace of remaining earthworks is visible on the LiDAR of the same date.   |
|                  |   |          |         | Ridge and furrow                 | C        | HS2 Vertical Photography SP5443 2012                  | Ridge and furrow is visible on 2012 vertical aerial photographs as cropmarks. No trace of remaining earthworks is visible on the LiDAR of the same date.   |
|                  |   |          |         | Ridge and furrow                 | C        | HS2 Vertical Photography SP5443 2012                  | Ridge and furrow is visible on 2012 vertical aerial photographs as cropmarks. No traces of remaining earthworks are visible on the LiDAR of the same date.   |
|                  |   |          |         | Ridge and furrow                 | E        | HS2 LiDAR 2012  | Ridge and furrow is visible on LiDAR as slight earthworks in the field to the south-west of Greatworth Park.   |
| O13<br>(GLB218)  | N/A   | N/A      | MD / PM | Ridge and furrow                 | E        | HS2 LiDAR 2012  | Ridge and furrow is very faintly visible on LiDAR in this field. Faint mounds that formed the foundations of WT Station Masts (HER 7059/1) are visible on top, but have not been mapped here as they are recorded on historic OS maps of 1970 and 1982.      |

| Aerial Survey ID | National record of the historic environment | HER  | Period  | Type  | Evidence | Source  | Description   |
|------------------|---|------|---------|---|----------|---|---|
|                  |   |      |         |   |          |   | Ridge and furrow earthworks strongly visible on LiDAR at Greatworth Park, site of former Royal Air Force (RAF) Wireless Transmission Station (HER 7059/1). Concrete foundations for the masts are still in situ, so have been mapped around when defining ridge and furrow extent.                        |
| O14<br>(GLB219)  | N/A   | N/A  | MD / PM | Field boundary / boundary bank                | E        | HS2 LiDAR 2012  | The remains of a probable former field boundary are visible on LiDAR as a very faintly extant linear bank. Not recorded on the 1st–4th edition OS maps.   |
|                  |   |      |         | Ridge and furrow                              | C        | Pan-Government Agreement SP5443 02-SEPT-2004                            | Ridge and furrow is faintly visible as cropmarks on vertical aerial photographs of 2004. Western extent is uncertain as it fades out very gradually across that part of the field.  |
|                  |   |      |         | Ridge and furrow                              | C        | HS2 Vertical Photography SP5443-5444 2012                               | Ridge and furrow is visible as cropmarks across this field. 2012 LiDAR indicates no earthworks remain.  |
|                  |   |      |         | Ridge and furrow                              | E        | HS2 LiDAR 2012  | Ridge and furrow is visible on LiDAR as extant earthworks beneath the trees of Painter's Spinney.   |
|                  |   |      |         | Ridge and furrow                              | E        | HS2 LiDAR 2012  | Ridge and furrow is visible on LiDAR as extant earthworks beneath the trees of Painter's Spinney. Likely to continue beneath the rest of the woodland to the north-east, but this is beyond the edge of both the LiDAR coverage and the project boundary.   |
|                  |   |      |         | Ridge and furrow                              | E        | HS2 LiDAR 2012  | Ridge and furrow is visible on LiDAR as extant earthworks beneath the trees of Painter's Spinney. Markedly degraded in the northern part of this small patch of woodland, but still just visible.   |
|                  |   |      |         | Ridge and furrow                              | C        | HS2 Hyperspectral 2012 (Run 19c Bands 19-23)                            | Two fields of ridge and furrow are visible as cropmarks on bands 19-23 of the hyperspectral imagery.  |
|                  |   |      |         | Ridge and furrow                              | E        | HS2 Vertical Photography SP5543 2012 / HS2 LiDAR 2012                   | Ridge and furrow visible on both modern vertical aerial photographs and LiDAR as faintly extant earthworks. It is likely it continues to the north-east across the rest of the field, but this is beyond the project boundary (and LiDAR coverage) so has not been mapped.                                |
| O15              | N/A   | N/A  | MD / PM | Field boundary / boundary bank                | E        | HS2 LiDAR 2012  | A probable former field boundary is visible on LiDAR as a faintly extant rectilinear bank. Not recorded on the 1st–4th Edition OS maps.   |
|                  |   |      |         | Ridge and furrow                              | E        | HS2 LiDAR 2012  | Ridge and furrow is visible as earthworks on 2012 LiDAR. It is likely it continues to the south-west across the rest of the field, but this is beyond the project boundary (and LiDAR coverage) so has not been mapped.   |
| O16              | N/A   | N/A  | PM / UN | Extractive pit / natural feature              | E        | HS2 LiDAR 2012  | Three very large sub-oval shallow depressions are visible on LiDAR of 2012. Not recorded on historic OS maps. Possible extractive pits for the underlying limestone and sandstone, but may alternatively be natural features such as dolines.   |
| O17<br>(GLB072)  | 970181                                      | 9909 | MD      | Deserted settlement                           | E        | HS2 LiDAR 2012  | Building platforms, trackways, boundary banks and ditches are visible as faintly extant earthworks. Continue to the south-west beyond the project boundary. Previously mapped for Northamptonshire national mapping programme, but re-mapped here as modern LiDAR provided a clearer picture of the site. |
|                  |   |      |         | Fishpond / deserted settlement                | E        | HS2 LiDAR 2012  | A series of rectilinear banks and ditches aligned south-east to north-west (leading towards a drain that feeds into a stream). May be toft or croft remains of the Costow deserted settlement. May alternatively have been fish ponds associated with settlement.   |
|                  |   |      |         | Moat / deserted settlement                    | E        | HS2 LiDAR 2012  | A square area bounded by faintly extant banks and ditches may have been a medieval moated site. It appears to be cut by later ridge and furrow, which also still survives as earthworks. Located adjacent to a drain which leads to the stream to the north.  |
| O18<br>(GLB072)  | 970181                                      | 9909 | MD / PM | Ridge and furrow                              | E        | HS2 LiDAR 2012  | Ridge and furrow, faintly visible on LiDAR as extant earthworks, appears to truncate earlier features (O17).  |
| O19<br>(GLB213)  | N/A   | N/A  | BA / UN | Round barrow / ring ditch / cultivation marks | C        | HS2 Vertical Photography SP5543 2012 / HS2 Hyperspectral 2012 (Run 19c) | Southern half of a possible round barrow shows as dark cropmarks of two concentric ring ditches. May alternatively be modern vehicle marks.   |

| Aerial Survey ID | National record of the historic environment | HER      | Period  | Type                            | Evidence | Source         | Description   |
|------------------|---|----------|---------|---------------------------------|----------|----------------|---|
|                  |   |          |         |                                 |          | Band 18)       |   |
| O20              | N/A   | 6642/0/8 | MD / PM | Ridge and furrow                | E        | HS2 LiDAR 2012 | Possible earthwork remains of ridge and furrow are visible in the northern corner of a field to the west of Costow House. It is not possible to be certain of the interpretation as only a small part of the overall field has been covered by the LiDAR.                             |
| O21              | N/A   | 6642/0/1 | MD / PM | Ridge and furrow                | E        | HS2 LiDAR 2012 | Ridge and furrow is visible on LiDAR as earthworks at the eastern end of the field to the south-east of Rectory Plantation. Likely to continue beyond project boundary but not included in the mapping.   |
| O22              | (GLB081)                                    | 6642/0/5 | MD / PM | Ridge and furrow                | E        | HS2 LiDAR 2012 | Ridge and furrow is visible on LiDAR as extant earthworks in the field between the Manor House and the Sewage Works.  |
|                  |   |          |         |                                 |          |                | Ridge and furrow is visible on LiDAR as extant earthworks. Cut towards the south-east by two later tracks or drainage ditches (HER 6150/0/5 - mapped by Northamptonshire national mapping programme project). The ridge and furrow is more faintly visible on this side of the field. |
|                  |   |          |         |                                 |          |                | Ridge and furrow is visible on LiDAR as extant earthworks. Cut towards the northern end by several later tracks or drainage ditches (HER 6150/0/4 - mapped by Northamptonshire national mapping programme P project). The ridge and furrow is more faintly visible there.             |
|                  |   |          |         |                                 |          |                | Three areas of ridge and furrow are visible on LiDAR within the same field. Cut by various probably post-medieval trackways, drainage ditches or other features (HER 6150, 253/0/1 - mapped by Northamptonshire national mapping programme project).                                  |
| O23              | (GLB222)                                    | N/A      | MD / PM | Boundary bank / field boundary  | E        | HS2 LiDAR 2012 | Ridge and furrow and a contemporary field boundary bank and ditch are visible on LiDAR as extant earthworks. Cut by later possible trackways or field boundaries (O24).   |
|                  |   | N/A      | MD / PM | Boundary ditch / field boundary | E        | HS2 LiDAR 2012 | Ridge and furrow and a contemporary field boundary bank and ditch are visible on LiDAR as extant earthworks. Cut by later possible trackways or field boundaries (O24).   |
|                  |   | 6642/0/9 | MD / PM | Field boundary / boundary bank  | E        | HS2 LiDAR 2012 | A former field boundary bank is visible on LiDAR as an extant earthwork between two blocks of ridge and furrow on different orientations.   |
|                  |   | 6642/0/9 | MD / PM | Ridge and furrow                | E        | HS2 LiDAR 2012 | Four blocks of ridge and furrow are visible as extant earthworks on LiDAR within one large field.   |
|                  |   | 6642/0/9 | MD / PM | Ridge and furrow                | E        | HS2 LiDAR 2012 | Four blocks of ridge and furrow are visible as extant earthworks on LiDAR within one large field. This block is the least well-preserved of the four in this field.   |
|                  |   | N/A      | MD / PM | Ridge and furrow                | E        | HS2 LiDAR 2012 | Ridge and furrow and a contemporary field boundary bank and ditch are visible on LiDAR as extant earthworks. Cut by later possible trackways or field boundaries (O24).   |
|                  |   | 6642/0/9 | MD / PM | Ridge and furrow                | E        | HS2 LiDAR 2012 | Ridge and furrow is visible on LiDAR as extant earthworks.  |
|                  |   | N/A      | MD / PM | Ridge and furrow                | E        | HS2 LiDAR 2012 | Ridge and furrow is visible on LiDAR as extant earthworks. Likely to continue across the rest of the field to the north-east, but this is beyond the edge of the survey boundary and LiDAR coverage.  |
| O24              | (GLB222)                                    | N/A      | MD / PM | Trackway                        | E        | HS2 LiDAR 2012 | Possible medieval or post-medieval trackways are visible as linear banks and scarps cutting through earlier ridge and furrow (O23).   |
|                  |   |          |         |                                 |          |                | Possible medieval or post-medieval trackways are visible as linear banks and scarps cutting through earlier ridge and furrow (O23). They can be seen on LiDAR as extant earthworks.   |
| O25              | (GLB078)                                    | 339365   | MD      | Dam / fishpond                  | E        | HS2 LiDAR 2012 | The dam of a medieval fishpond is visible as an extant linear bank in the field to the north of the Thorpe Mandeville Sewage Works. The stream now flows through a gap in its centre, and the eastern end is beneath trees. Known locally as 'Giant's Grave'.                         |
|                  |   |          |         | Fishpond                        | E        | HS2 LiDAR 2012 | A probable medieval fishpond is visible on LiDAR as a shallow scarp edge in the valley side. Only the possible western edge of the pond can be seen. A linear earthwork bank to the north-north-east formed a dam for the pond.   |

| Aerial Survey ID | National record of the historic environment | HER        | Period  | Type             | Evidence | Source         | Description   |
|------------------|---|------------|---------|------------------|----------|----------------|---|
| O26<br>(GLB083)  | 339347                                      | 253 / 5838 | MD      | Windmill mound   | E        | HS2 LiDAR 2012 | A mound recorded by the HER and English Heritage as both a bowl barrow and a windmill mound. The ridge and furrow visible within this field does not deviate around the mound; the mound appears to sit on top of it. Scheduled monument 1010435.                   |
| O27<br>(GLB084)  | N/A   | N/A        | MD / PM | Ridge and furrow | E        | HS2 LiDAR 2012 | Ridge and furrow is visible on LiDAR as slight earthworks.  |
| O28              | N/A   | 6642/o/4   | MD / PM | Plough headland  | E        | HS2 LiDAR 202  | A plough headland is visible on LiDAR as an extant linear bank surrounded by ridge and furrow.  |
|                  |   | N/A        | MD / PM | Plough headland  | E        | HS2 LiDAR 2012 | A plough headland is visible on LiDAR as an extant, gently curving linear bank surrounded by ridge and furrow within the field to the north of Lower Thorpe.  |
|                  |   | N/A        | MD / PM | Ridge and furrow | E        | HS2 LiDAR 2012 | A fragment of ridge and furrow is just visible as earthworks on LiDAR in the easternmost corner of a field, at the point where it slopes down towards the stream.   |
|                  |   | N/A        | MD / PM | Ridge and furrow | E        | HS2 LiDAR 2012 | Possible ridge and furrow is visible as extant earthworks on LiDAR beneath an area of woodland. The possible ridges and furrows are very narrowly-spaced and may therefore alternatively be ground preparation for the plantation.                                  |
|                  |   | N/A        | MD / PM | Ridge and furrow | E        | HS2 LiDAR 2012 | Ridge and furrow is clearly visible on LiDAR as earthworks across the large field to the north of Lower Thorpe. Cut at two separate points by later quarry pits (O34).  |
|                  |   | N/A        | MD / PM | Ridge and furrow | E        | HS2 LiDAR 202  | Ridge and furrow is faintly visible on LiDAR as earthworks in the northern corner of this field, against the railway embankment. Less well-preserved than the ridge and furrow across the rest of the field to the south.   |
|                  |   | N/A        | MD / PM | Ridge and furrow | E        | HS2 LiDAR 2012 | Ridge and furrow is faintly visible on LiDAR as earthworks in the northern corner of this field, against the railway embankment. Less well-preserved than the ridge and furrow across the rest of the field to the south.   |
|                  |   | N/A        | MD / PM | Ridge and furrow | E        | HS2 LiDAR 202  | Ridge and furrow is very faintly visible as almost-levelled earthworks on LiDAR.  |
|                  |   | N/A        | MD / PM | Ridge and furrow | E        | HS2 LiDAR 2012 | Ridge and furrow is very faintly visible as almost-levelled earthworks on LiDAR.  |
|                  |   | N/A        | MD / PM | Ridge and furrow | E        | HS2 LiDAR 202  | Ridge and furrow is visible as earthworks on LiDAR in the field to the west of Manor Cottages. Cut by a couple of later features (O32, O33) and not as well-preserved as the ridge and furrow to the north and north-west.  |
|                  |   | N/A        | MD / PM | Ridge and furrow | E        | HS2 LiDAR 2012 | Ridge and furrow is visible as earthworks on LiDAR in the field to the west of Manor Cottages. Cut by a couple of later features (O32,33) and not as well-preserved as the ridge and furrow to the north and north-west.  |
|                  |   | 6642/o/3   | MD / PM | Ridge and furrow | E        | HS2 LiDAR 202  | Well-preserved ridge and furrow is visible as earthworks on LiDAR.  |
|                  |   | N/A        | MD / PM | Ridge and furrow | E        | HS2 LiDAR 202  | Well-preserved ridge and furrow is visible as earthworks on LiDAR.  |
|                  |   | 6642/o/3   | MD / PM | Ridge and furrow | E        | HS2 LiDAR 2012 | Well-preserved ridge and furrow is visible as earthworks on LiDAR.  |
|                  |   | N/A        | MD / PM | Ridge and furrow | E        | HS2 LiDAR 2012 | Well-preserved ridge and furrow is visible as earthworks on LiDAR.  |
|                  |   | N/A        | MD / PM | Ridge and furrow | E        | HS2 LiDAR 202  | Well-preserved ridge and furrow is visible on LiDAR as earthworks to the north-west of Lower Thorpe. Cut by a large probable post-medieval quarry (O29) in the southern half of the field.  |
|                  |   | N/A        | MD / PM | Ridge and furrow | E        | HS2 LiDAR 2012 | Well-preserved ridge and furrow is visible on LiDAR as earthworks to the north-west of Lower Thorpe. Cut by a large probable post-medieval quarry (O29) in the southern half of the field.  |
|                  |   | 6642/o/4   | MD / PM | Ridge and furrow | E        | HS2 LiDAR 202  | Well-preserved ridge and furrow is visible on LiDAR as earthworks within the field to the south-west of Lower Thorpe. Likely to continue to the south-west, but has not been mapped there as it is beyond the edge of both the project boundary and LiDAR coverage. |
|                  |   | 6642/o/4   | MD / PM | Ridge and furrow | E        | HS2 LiDAR 2012 | Well-preserved ridge and furrow is visible on LiDAR as earthworks within the field to the south-west of Lower Thorpe. Likely to continue to the south-west, but has not been mapped there as it is beyond the edge of both the project boundary and LiDAR coverage. |

| Aerial Survey ID | National record of the historic environment | HER      | Period       | Type                                  | Evidence | Source  | Description  |
|------------------|---|----------|--------------|---------------------------------------|----------|---|--|
| O29              | N/A   | N/A      | PM / UN      | Extractive pit / quarry               | E        | HS2 LiDAR 2012                                    | A very large quarry pit is visible as an irregularly-shaped hollow along the crest of the hill within this field. It is cut into earlier ridge and furrow cultivation (O28). The eastern end is marked on the 1st ed. OS map.  |
| O30              | N/A   | N/A      | MD / PM      | Ridge and furrow                      | E        | HS2 LiDAR 2012                                    | A fragment of ridge and furrow is just visible on LiDAR as faintly visible extant earthworks. The ridges and furrows are very widely-spaced and occupy a small triangle of land between Culworth Farm and a patch of woodland.   |
| O31              | N/A   | N/A      | MD / PM      | Trackway                              | E        | HS2 LiDAR 202                                     | A possible former trackway is visible as a narrow curvilinear ditch cutting through ridge and furrow. Crosses a field boundary, but no corresponding gateway so presumably pre-dates it. Appears to lead towards the site of a spring to the north-east.               |
| O32              | N/A   | N/A      | PM / C20     | Hydraulic power site                  | E        | HS2 LiDAR 202                                     | A roughly square bank with a hollow in the centre and a slight ditch along its outer southern edge is visible as earthworks on LiDAR. May be the remains of a structure associated with the adjacent hydraulic rams marked on the OS 2nd and 3rd Edition OS maps.      |
| O33              | N/A   | N/A      | PM / UN      | Extractive pit                        | E        | HS2 LiDAR 202                                     | A possible post-medieval extractive pit or small quarry is visible as a hollow on the edge of the field to the west of Manor Cottages. Cuts earlier ridge and furrow (O28).  |
| O34              | N/A   | N/A      | PM / UN      | Extractive pit / quarry               | E        | HS2 LiDAR 2012                                    | Two very large quarry pits are visible as irregularly-shaped hollows on the crests of the hill within this field. They cut into earlier ridge and furrow (O28) and are not marked on historic OS maps. Probably associated with larger quarry to the north (O29).      |
| O35<br>(GLB223)  | N/A   | N/A      | RO / MD      | Field boundary / boundary bank        | E        | HS2 LiDAR 202                                     | An early field boundary or other boundary bank is visible on LiDAR as a faintly extant linear earthwork. The LiDAR shows it is cut by the medieval or post-medieval ridge and furrow (as well as the current field boundary).  |
| O36              | N/A   | N/A      | MD / PM      | Ridge and furrow                      | C        | HS2 Vertical Photography SP5245-5246 2012         | Ridge and furrow is visible on 2012 vertical aerial photography as cropmarks in fields to the north of the dismantled railway.   |
|                  |   |          |              |                                       |          | Pan-Government Agreement SP5346 02-SEPT-2004      | Ridge and furrow is visible on 2012 vertical aerial photography as cropmarks in fields to the north of the dismantled railway.   |
| O37              | N/A   | N/A      | MD / PM / UN | Field boundary / boundary bank        | C        | HS2 Vertical Photography SP5346 2012              | Possible field boundary bank visible as faint cropmark. Not recorded on historic OS maps. Possible prehistoric settlement also recorded as ditched enclosure cropmarks in these fields (HER: 9599, English Heritage: 1498277), but not clear that they are associated. |
| O38              | N/A   | N/A      | MD / PM      | Ridge and furrow                      | C        | HS2 Vertical Photography SP5246 2012              | A small patch of possible ridge and furrow is visible as cropmarks within a field dominated by the cropmarks of modern field drains.   |
| O39              | N/A   | N/A      | MD / PM      | Ridge and furrow                      | C        | HS2 Vertical Photography SP5246 2012              | An area of ridge and furrow is visible as faint cropmarks within a larger field on the eastern side of Danes Moor.   |
| O40              | N/A   | N/A      | MD / PM      | Field boundary / boundary bank        | C        | HS2 Vertical Photography SP5246 2012              | A thin linear light cropmark indicates a possible former field boundary bank.  |
| O41<br>(GLB234)  | N/A   | N/A      | MD / PM      | Ridge and furrow                      | E        | HS2 LiDAR 2012                                    | Ridge and furrow is visible on LiDAR as extant earthworks. Likely to continue to the east across the rest of the field, but not mapped beyond the edge of the survey boundary and LiDAR coverage.  |
| O42              | N/A   | N/A      | MD / PM      | Cultivation terrace / natural feature | E        | HS2 LiDAR 2012                                    | A scarp edge is visible on LiDAR as an earthwork crossing the field south-west to north-west. Possible early field boundary or cultivation terrace, but not recorded on early OS maps. May be a natural feature, but seems too well-defined for that.                  |
| O43              | N/A   | N/A      | MD / PM      | Ridge and furrow                      | C        | Pan-Government Agreement SP5146-5246 02-SEPT-2004 | Ridge and furrow is faintly visible as cropmarks in a field on the eastern side of Danes Moor. Continues to the south-west across the rest of the field, but not mapped beyond the survey boundary.  |
| O44              | N/A   | 5400/o/6 | MD / PM      | Ridge and furrow                      | E        | HS2 LiDAR 2012                                    | Ridge and furrow is clearly visible as extant earthworks on LiDAR. Cut by a post-medieval quarry (O46).  |
|                  |   | N/A      | MD / PM      | Ridge and furrow                      | C        | HS2 Hyperspectral 2012 (Run)                      | Ridge and furrow is faintly visible as cropmarks on hyperspectral imagery in the field to the north-east of Danesmoor  |

| Aerial Survey ID | National record of the historic environment | HER      | Period  | Type                                | Evidence | Source                                       | Description  |
|------------------|---|----------|---------|-------------------------------------|----------|--|--|
|                  |   |          |         |                                     |          | 20a Bands 7, 13, 22)                         | Spinney.   |
|                  |   |          |         |                                     |          | Pan-Government Agreement SP5247 02-SEPT-2004 | Ridge and furrow is visible as cropmarks on vertical aerial imagery of 2004.   |
| O45              | N/A   | N/A      | MD / PM | Field boundary / boundary ditch     | C        | Pan-Government Agreement SP5247 02-SEPT-2004 | A possible former field boundary ditch is visible across the northern end of this field. Not recorded on historic OS maps. Possibly associated with the ridge and furrow visible as cropmarks on its southern side (O44).                                      |
| O46              | N/A   | N/A      | PM / UN | Extractive pit / quarry             | E        | HS2 LiDAR 2012                               | A small quarry is visible on LiDAR as a ragged depression cutting into the surrounding extant ridge and furrow (O44). Indicated on the 2nd and 3rd Edition OS maps, but nowhere near in its full extent.   |
| O47<br>(GLB225)  | N/A   | N/A      | MD / PM | Ridge and furrow                    | E        | HS2 LiDAR 2012                               | Ridge and furrow is faintly visible as poorly-preserved earthworks across part of a field to the south-west of Culworth Mill.  |
| O48              | N/A   | N/A      | MD / PM | Ridge and furrow                    | C        | Pan-Government Agreement SP5147 02-SEPT-2004 | A small area of ridge and furrow is visible as cropmarks on the northern side of a field to the north-east of Trafford Bridge Farm.  |
|                  |   |          |         |                                     | C        | HS2 Vertical Photography SP5147 2012         | Ridge and furrow is visible as cropmarks in a field to the north-west of Danesmoor Spinney.  |
|                  |   |          |         |                                     | E        | HS2 LiDAR 2012                               | Ridge and furrow is visible as earthworks on LiDAR to the west of the stream between Trafford Bridge and Trafford Bridge Farm. Cut by a later post-medieval extractive pit (O49).  |
| O49              | N/A   | N/A      | PM / UN | Extractive pit                      | E        | HS2 LiDAR 2012                               | A probably post-medieval extractive pit is visible on LiDAR as a ragged depression cutting into extant ridge and furrow (O48). Not recorded on historic OS maps.   |
| O50              | N/A   | N/A      | MD / PM | Ridge and furrow                    | C        | HS2 Vertical Photography SP5147 2012         | Ridge and furrow is faintly visible as cropmarks in part of the large field to the south of Osierbed Spinney. Possibly elsewhere in the field too, but too faint to be sure. Gap in northern end corresponds with house/barn marked on 1st ed. OS map of 1884. |
| O51              | N/A   | 9904/0/1 | MD / PM | Field boundary / boundary bank      | C        | HS2 Vertical Photography SP5147 2012         | An irregularly-shaped slightly curvilinear bank cropmark may indicate a former boundary or enclosure bank. Possibly associated with the medieval or post-medieval stock enclosures visible as cropmarks to the south-east.                                     |
|                  |   |          |         | Stock enclosure / ditched enclosure | C        | HS2 Vertical Photography SP5147 2012         | Two possible sheepfolds or stock enclosures are visible as partially-complete rectilinear cropmarks. May be associated with possible farm structures recorded in the vicinity on early OS maps.  |
|                  |   |          |         | Stock enclosure / ditched enclosure | C        | HS2 Vertical Photography SP5147 2012         | Two possible sheepfolds or stock enclosures are visible as partially-complete rectilinear cropmarks. Northamptonshire national mapping programme mapped a rectilinear cropmark adjacent to the western side of this possible ditched enclosure.                |
| O52              | N/A   | N/A      | MD / PM | Ridge and furrow                    | C        | Pan-Government Agreement SP5148 02-SEPT-2004 | Ridge and furrow is visible as cropmarks on vertical aerial photographs of 2004 in a field to the north of Trafford Bridge. Continues to the north-east across the rest of the field, but not mapped beyond the survey boundary.                               |
|                  |   |          |         |                                     | E        | HS2 LiDAR 2012                               | An area of ridge and furrow is visible in the north-east corner of the field on the northern side of Osierbed Spinney. It can be seen on LiDAR as faintly extant earthworks.   |
|                  |   |          |         |                                     | C        | HS2 Vertical Photography SP5148 2012         | Ridge and furrow is faintly visible as cropmarks. Cut by a later extractive pit (O55).   |
| O53              | N/A   | N/A      | MD / PM | Ridge and furrow                    | E        | HS2 LiDAR 2012                               | Ridge and furrow earthworks visible on LiDAR.  |
| O54              | N/A   | N/A      | PM / UN | Extractive pit / natural feature    | E        | HS2 LiDAR 2012                               | A possible former extractive pit is visible on LiDAR as a shallow depression in the southern corner of the field on the northern side of Osierbed Spinney. May alternatively be a natural feature such as a doline.  |
|                  |   |          |         | Extractive pit / quarry             | E        | HS2 LiDAR 2012                               | A large extractive pit or small quarry is visible on LiDAR as a ragged shallow depression in the field on the northern side of Osierbed Spinney. Indicated on the 1st Edition OS map of 1884, but nowhere near in its full extent.                             |
| O55              | N/A   | N/A      | PM / UN | Extractive pit / quarry             | E / C    | HS2 LiDAR 2012 / HS2 Vertical                | A large extractive pit is visible as both a shallow irregularly-shaped depression on LiDAR and a cropmark on vertical  |

| Aerial Survey ID | National record of the historic environment | HER      | Period       | Type                                    | Evidence | Source                                   | Description   |
|------------------|---|----------|--------------|---|----------|--|---|
|                  |   |          |              |   |          | Photography SP5148 2012                  | aerial photographs of 2012. Possibly extends further to the north, but not clear from the imagery. Not on historic OS maps.   |
| O56              | N/A   | N/A      | RO / PM / UN | Settlement / extractive pit             | C        | HS2 Vertical Photography SP5148 2012     | One curvilinear and two pit-shaped ditch cropmarks which may be either associated with the Roman period remains to the west (HER: 366, English Heritage: 339306, scheduled monument: 1006616), or the post-medieval extractive activity just to the south (O55).        |
| O57<br>(GLB227)  | N/A   | N/A      | MD / PM      | Ridge and furrow                        | E        | HS2 LiDAR 2012                           | Poorly-preserved ridge and furrow is visible as subtle earthworks on LiDAR. Condition varies throughout, with signs of disturbance most evident in the north-west corner. Within scheduled monument polygon (Roman Villa: 1006616, English Heritage: 339306, HER: 366). |
| O58              | N/A   | N/A      | MD           | Field boundary / boundary bank          | E        | HS2 LiDAR 2012                           | A former field boundary bank is visible as a very faintly extant and greatly plough-spread linear earthwork on LiDAR. The N/S stretch is close to a ditch cropmark which is marked on the 1st Edition OS map of 1884 as a field boundary, but it is not identical.      |
| O59              | N/A   | N/A      | MD           | Field boundary / boundary bank          | E        | HS2 LiDAR 2012                           | A former field boundary bank is visible to the east of Blackgrounds as a very faintly extant and greatly plough-spread linear earthwork on LiDAR. Not recorded on historic OS maps.   |
| O60              | N/A   | N/A      | PM / UN      | Extractive pit / natural feature        | E        | HS2 LiDAR 2012                           | A probable large extractive pit is visible on LiDAR as a shallow, irregularly-shaped depression in the field in the crook of the junction between Welsh Road and Culworth Road. Not recorded on historic OS maps. Alternatively a possible composite doline.            |
| O61<br>(GLB153)  | N/A   | N/A      | MD / PM      | Ridge and furrow                        | E        | HS2 LiDAR 2012                           | Ridge and furrow is clearly visible as extant earthworks in the small field to the west of The Bungalow on the south-west side of Calves Cross Spinney.   |
|                  |   | 4833/0/8 | MD / PM      | Ridge and furrow                        | E        | HS2 LiDAR 2012                           | Ridge and furrow is very faintly visible on LiDAR as extant earthworks on the north-east side of The Spinney. Likely to continue across the rest of the field to the north-east, but as this is beyond the project boundary it has not been mapped.                     |
|                  |   | N/A      | MD / PM      | Ridge and furrow                        | C        | HS2 Vertical Photography SP5049 2012     | Ridge and furrow is visible as cropmarks in the south-west corner of the field on the north-west side of Calves Close Spinney. Appears to cut an earlier bank that is faintly visible as an earthwork (O64).  |
|                  |   | N/A      | MD / PM      | Ridge and furrow                        | C        | HS2 Hyperspectral 2012 (Run 20a Band 13) | Ridge and furrow is visible as cropmarks on hyperspectral imagery in the field to the south of Calves Close Spinney.  |
|                  |   | N/A      | MD / PM      | Ridge and furrow                        | E        | HS2 LiDAR 2012                           | Two patches of ridge and furrow are visible as earthworks on LiDAR beneath the trees of Calves Cross Spinney. They have been cut by drainage ditches and numerous WWII structures associated with the nearby RAF Airfield (O62).  |
|                  |   | N/A      | MD / PM      | Ridge and furrow                        | E        | HS2 LiDAR 2012                           | Two small areas of ridge and furrow are faintly visible as extant earthworks on LiDAR. They coincide with former field boundary banks also visible on LiDAR as earthworks here.   |
|                  |   | N/A      | MD / PM      | Ridge and furrow                        | E        | HS2 LiDAR 2012                           | Very poorly-preserved ridge and furrow is just visible as earthworks in the grounds on the eastern side of The Bungalow.  |
|                  |   | N/A      | MD / PM      | Ridge and furrow                        | E        | HS2 LiDAR 2012                           | Well-preserved ridge and furrow is visible as extant earthworks on LiDAR in a field between Culworth Road and Welsh Road.   |
| O62<br>(GLB154)  | 1391875                                     | 7051/1   | WWII         | Blast shelter                           | S        | HS2 Vertical Photography SP5049 2012     | Two WWII-era open-topped blast shelters can be seen as surviving structures. They were associated with the WWII RAF Chipping Warden Airfield located to the north-east, and formed part of a dispersed site located beneath the trees of Calves Close Spinney.          |
|                  |   |          |              | Military airfield site / dispersed site | S        | HS2 LiDAR 2012                           | Remains of structures likely to have formed part of a WWII airfield dispersed site are visible on LiDAR beneath the trees of a spinney. Some are on the modern OS map. Not possible to determine condition/state or always the precise shape from LiDAR.                |
|                  |   |          |              | Path                                    | S        | HS2 Vertical Photography SP5049 2012     | A possible path connecting various structures likely to have formed part of WWII Chipping Warden Airfield dispersed site at Calves Close Spinney is just visible between the trees on vertical aerial photographs.  |

| Aerial Survey ID | National record of the historic environment | HER | Period  | Type                             | Evidence | Source   | Description  |
|------------------|---|-----|---------|----------------------------------|----------|--|--|
| O63              | N/A   | N/A | MD / PM | Ridge and furrow                 | E        | HS2 LiDAR 2012   | Ridge and furrow is visible as extant earthworks on LiDAR within a sports field on the eastern side of Chipping Warden.  |
| O64              | N/A   | N/A | MD      | Field boundary / boundary bank   | E        | HS2 LiDAR 2012   | Likely former field boundaries are visible on LiDAR as faintly extant and greatly plough-spread linear earthworks. They are not recorded on historic OS maps.  |
|                  |   |     |         |                                  |          |  | Likely former field boundaries are visible on LiDAR as faintly extant and greatly plough-spread linear earthworks. They are not recorded on historic OS maps. These two appear to be cut by ridge and furrow which can be seen as cropmarks (O61).         |
| O65              | N/A   | N/A | MD      | Field boundary / boundary bank   | E        | HS2 LiDAR 2012   | Likely former field boundaries are visible on LiDAR as faintly extant and greatly plough-spread linear earthworks. They are not recorded on historic OS maps.  |
| O66              | N/A   | N/A | PM / UN | Extractive pit / natural feature | E        | HS2 LiDAR 2012   | A possible former quarry pit is visible on LiDAR as a shallow oblong depression. It may alternatively be a natural feature, but quarry pits are common in the vicinity. Not recorded on historic OS maps.  |
| O67              | N/A   | N/A | PM / UN | Extractive pit / quarry          | E        | HS2 LiDAR 2012   | A possible post-medieval quarry pit is visible on LiDAR as a large, shallow, irregularly-shaped depression in the corner of a field on the north-east side of Chipping Warden. Not recorded on historic OS maps.   |
| O68              | N/A   | N/A | MD / PM | Field boundary / boundary bank   | E        | HS2 LiDAR 2012   | Two probably medieval former field boundary banks are visible as faintly extant linear earthworks on LiDAR. Not recorded on historic OS maps. Coincides with alignment of ridge and furrow also faintly visible as earthworks here.                        |
| O69              | N/A   | N/A | PM      | Field boundary / boundary bank   | E        | HS2 LiDAR 2012   | A possible former boundary bank is visible on LiDAR as an extant linear earthwork between the school and the disused airfield at Chipping Warden.  |
| O70              | N/A   | N/A | MD / PM | Ridge and furrow                 | C        | HS2 Vertical Photography SP4949 2012 / Pan-Government Agreement SP4949 02-SEP-2004 | Several blocks of ridge and furrow are visible as cropmarks within the disused airfield at Chipping Warden.  |
| O71              | N/A   | N/A | MD      | Field boundary / boundary bank   | C        | HS2 Vertical Photography SP4949 2012 / Pan-Government Agreement SP4949 02-SEP-2004 | Visible on aerial photographs as a cropmark and on LiDAR as a slightly extant earthwork. Cropmarks of ridge and furrow over the top of it (O70). Not recorded on historic OS maps, as are the other visible remains of field boundaries in this field.     |
| O72              | N/A   | N/A | MD / PM | Field boundary / boundary bank   | E        | HS2 LiDAR 2012   | A likely former field boundary bank is visible as an extant linear earthwork across a field on the north-west side of the disused Chipping Warden Airfield. May alternatively be a remnant of the airfield layout/infrastructure. Not on historic OS maps. |
| O73              | N/A   | N/A | MD / PM | Ridge and furrow                 | E        | HS2 LiDAR 2012   | Ridge and furrow is faintly visible on LiDAR as heavily-degraded earthworks in a field on the south-west side of Valley View Farm, Aston le Walls.   |
| O74              | N/A   | N/A | MD / PM | Ridge and furrow                 | C        | Pan-Government Agreement SP4850-4851 02-SEPT-2004                                  | Ridge and furrow is faintly visible as cropmarks. Continues across the rest of the field to the north-east, but not mapped beyond the survey boundary.   |
| O75              | N/A   | N/A | MD / PM | Ridge and furrow                 | C        | HS2 Vertical Photography SP4850, 4851, 4751 2012                                   | Ridge and furrow is faintly visible as cropmarks. Continues across the rest of the field to the south-west, but not mapped beyond the survey boundary.   |
|                  |   | N/A | MD / PM | Ridge and furrow                 | E        | HS2 LiDAR 2012   | Ridge and furrow is faintly visible as extant earthworks on the north-west side of the river/stream. Truncated extensively by modern field drains.   |
|                  |   | N/A | MD / PM | Ridge and furrow                 | C        | HS2 Vertical Photography SP4751 2012   | Ridge and furrow is just visible as cropmarks in the southern half of a field. Likely to continue across the rest of the field to the south, but not mapped beyond the survey boundary.  |
|                  |   | N/A | MD / PM | Ridge and furrow                 | E        | HS2 LiDAR 2012   | Ridge and furrow is just visible on LiDAR beneath a patch of woodland in the corner of a field. Can only be seen very faintly - presence confirmed by continuation of much more clearly-extant earthworks in the adjacent field.                           |
|                  |   | N/A | MD / PM | Ridge and furrow                 | C        | HS2 Vertical Photography   | Ridge and furrow is very faintly visible as cropmarks on vertical aerial photographs of 2012. Appears to cut an earlier  |

| Aerial Survey ID | National record of the historic environment | HER            | Period  | Type                                   | Evidence | Source                                       | Description  |
|------------------|---|----------------|---------|--|----------|--|--|
|                  |   |                |         |  |          | SP4850, 4851, 4751 2012                      | field boundary bank (O76).   |
|                  |   | N/A            | MD / PM | Ridge and furrow                       | E        | HS2 LiDAR 2012                               | Ridge and furrow is visible as extant earthworks on LiDAR. Likely to continue across the rest of the field to the north-east, but not mapped there as it is beyond the edge of the both project boundary and LiDAR coverage.   |
|                  |   | 9010/o/8       | MD / PM | Ridge and furrow                       | E        | HS2 LiDAR 2012                               | Ridge and furrow is visible as extant earthworks on LiDAR. Likely to continue across the rest of the field to the north-east, but not mapped there as it is beyond the edge of the both project boundary and LiDAR coverage.   |
|                  |   | N/A            | MD / PM | Ridge and furrow                       | E        | HS2 LiDAR 2012                               | Ridge and furrow is visible on LiDAR as earthworks in the eastern half of a field. The bank that forms its western boundary is visible on the LiDAR as an extant earthwork but has not been mapped as it is on the 1st Edition OS map of 1885.                                 |
|                  |   | N/A            | MD / PM | Ridge and furrow                       | C        | Pan-Government Agreement SP4851 o2-SEPT-2004 | Ridge and furrow is visible on vertical aerial photographs of 2004 as cropmarks.   |
| O76              | N/A   | N/A            | MD      | Field boundary / boundary bank         | E        | HS2 LiDAR 2012                               | A former field boundary bank is visible on LiDAR as a faintly extant linear earthwork. Appears to be cut by ridge and furrow (visible as cropmarks, O75) which did not level the bank. Not on historic OS maps.  |
| O77              | N/A   | N/A            | PM / UN | Extractive pit / quarry                | E        | HS2 LiDAR 2012                               | A probable post-medieval extractive pit is visible on LiDAR as a shallow sub-oval pit beside the bank of an old field boundary (which is marked on historic OS maps). The quarry pit is not recorded on historic OS maps.  |
| O78              | 337347                                      | 36<br>(GLB201) | MD      | Deserted settlement / shrunken village | E        | HS2 LiDAR 2012                               | Earthwork remains of former settlement on the north-east bank of the Canal Feeder, Lower Boddington. Possible toft boundaries, building platforms and hollow ways. Likely to continue to north-east, but only mapped up to the edge of the survey boundary and LiDAR coverage. |
|                  |   | N/A            | MD / PM | Plough headland / boundary bank        | E        | HS2 LiDAR 2012                               | A fragment of a possible plough headland is very faintly visible on LiDAR. Possible continuation from field to the south-east. Cropmarks of later ridge and furrow are visible over the top of it.   |
|                  |   | N/A            | MD / PM | Plough headland / boundary bank        | E        | HS2 LiDAR 2012                               | A possible plough headland is visible as a very faint earthwork on LiDAR. Cut by modern cultivation/plough-lines along the length of the field. Abuts an area of ridge and furrow on its southern side.  |
|                  |   | 9010/o/6       | MD / PM | Plough headland / boundary bank        | E        | HS2 LiDAR 2012                               | A possible plough headland is visible on LiDAR as an extant linear bank between two areas of ridge and furrow. Appears to have been used most recently as a trackway across the field leading from the gateway in the north-east corner.                                       |
|                  |   | N/A            | MD / PM | Plough headland / boundary bank        | C        | Pan-Government Agreement SP4752 o1-MAY-2007  | Possible plough headlands are visible as the cropmarks of linear banks between separate areas of ridge and furrow.   |
|                  |   | N/A            | MD / PM | Ridge and furrow                       | E        | HS2 LiDAR 2012                               | A fragment of ridge and furrow is visible on LiDAR as earthworks in the small triangular field to the south-east of Fir Tree House.  |
|                  |   | N/A            | MD / PM | Ridge and furrow                       | C        | Pan-Government Agreement SP4752 o1-MAY-2007  | Levelled ridge and furrow is clearly visible as cropmarks in the field between Fir Tree House and Cedar House Farm.  |
|                  |   | N/A            | MD / PM | Ridge and furrow                       | C        | HS2 Vertical Photography SP4751 2012         | Ridge and furrow is clearly visible as well-defined cropmarks in a field to the north-east of Springfield House.   |
|                  |   | 9010/o/6       | MD / PM | Ridge and furrow                       | C        | HS2 Vertical Photography SP4751 2012         | Ridge and furrow is clearly visible as well-defined cropmarks in a field to the north-east of Springfield House.   |
|                  |   | N/A            | MD / PM | Ridge and furrow                       | C        | HS2 Vertical Photography SP4751 2012         | Ridge and furrow is clearly visible as well-defined cropmarks in a field to the north-east of Springfield House. Likely to continue across the rest of the field to the south-west, but not mapped beyond the edge of the survey boundary.                                     |
|                  |   | N/A            | MD / PM | Ridge and furrow                       | E        | HS2 LiDAR 2012                               | Ridge and furrow is faintly visible as earthworks on LiDAR. A continuation of the ridge and furrow in the field to the east, where it is better preserved.   |
|                  |   | 9010/o/6       | MD / PM | Ridge and furrow                       | C        | HS2 Vertical Photography SP4751 2012         | Ridge and furrow is visible as cropmarks in a field between Springfield House and Lower Boddington.  |

| Aerial Survey ID | National record of the historic environment | HER       | Period  | Type                             | Evidence | Source  | Description   |
|------------------|---|-----------|---------|----------------------------------|----------|---|---|
|                  |   | N/A       | MD / PM | Ridge and furrow                 | C        | HS2 Vertical Photography SP4751 2012                            | Ridge and furrow is visible as cropmarks in a field between Springfield House and Lower Boddington.   |
|                  |   | N/A       | MD / PM | Ridge and furrow                 | E        | HS2 LiDAR 2012  | Ridge and furrow is visible as earthworks on LiDAR in the southern end of the field to the north of Cedar House Farm. The picture is confused by pronounced modern plough-lines on the same alignment which continue northwards up the field.                                     |
|                  |   | 9010/0/6  | MD / PM | Ridge and furrow                 | E        | HS2 LiDAR 2012  | Ridge and furrow is visible on LiDAR as earthworks in the southern half of a field between Cedar House Farm and Lower Boddington. Very poorly preserved in some areas, with damage likely attributable to modern agricultural activity.   |
|                  |   | N/A       | MD / PM | Ridge and furrow                 | E        | HS2 LiDAR 2012  | Ridge and furrow is visible on LiDAR as extant earthworks in the field to the south-west of the Church at Lower Boddington. Cut by modern drainage ditch, which has upcast along its western edge. More degraded on eastern side of this ditch.                                   |
|                  |   | N/A       | MD / PM | Ridge and furrow                 | E        | HS2 LiDAR 2012  | Ridge and furrow is visible on LiDAR as extant earthworks. Likely to continue across the rest of the field to the south, but not mapped there as it is beyond both the survey boundary and the edge of the LiDAR coverage. Cuts an earlier bank (O82).                            |
|                  |   | 9010/0/6  | MD / PM | Ridge and furrow                 | E        | HS2 LiDAR 2012  | Well-preserved ridge and furrow is clearly visible as extant earthworks on LiDAR in a field between Lower Boddington and the Canal Feeder.  |
|                  |   | 9010/0/6  | MD / PM | Ridge and furrow                 | E        | HS2 LiDAR 2012  | Well-preserved ridge and furrow is clearly visible as extant earthworks on LiDAR in a field between Springfield House and Lower Boddington.   |
|                  |   | 9010/0/6  | MD / PM | Ridge and furrow                 | E        | HS2 LiDAR 2012  | Well-preserved ridge and furrow is clearly visible on LiDAR as extant earthworks in the northern half of a field between Cedar House Farm and Lower Boddington.   |
|                  |   | O80       | N/A     | Ridge and furrow                 | C        | Pan-Government Agreement SP4752 01-MAY-2007                     | A small area of possible levelled ridge and furrow is visible as cropmarks in the field to the north of Spella House.   |
|                  |   |           |         |                                  |          |   | Levelled ridge and furrow is visible as cropmarks in the field to the south-east of Spella House. Not visible in some areas of the field, possibly due to differences in underlying geology. Also, clearly visible cropmarks of modern land drains that run north-west/south-east |
|                  |   |           |         |                                  |          |   | Levelled ridge and furrow is visible on vertical aerial photographs of 2007 as clear cropmarks in the field to the north of the Sewage Works on the western side of Lower Boddington.   |
| O81              | N/A   | N/A       | MD      | Field boundary / boundary bank   | E        | HS2 LiDAR 2012  | Two very faintly extant linear banks are just visible on LiDAR. Bisected by modern field boundary. Closely-spaced and parallel, so purpose not clear. Cut by both ridge and furrow and modern ploughing.  |
| O82              | N/A   | N/A       | MD      | Field boundary / plough headland | E        | HS2 LiDAR 2012  | A linear bank is faintly visible as an earthwork on LiDAR. Cut by ridge and furrow (O79), which is also still extant. Possible earlier plough headland or field boundary. Just to the north of modern farm track.   |
| O83              | N/A   | N/A       | MD / PM | Ridge and furrow                 | C        | HS2 Hyperspectral 2012 (Run 21b Bands 20, 21, 22)               | Levelled ridge and furrow is faintly visible as cropmarks on hyperspectral imagery in the field to the north-east of Three Shires.  |
|                  |   | N/A       | MD / PM | Ridge and furrow                 | C        | Pan-Government Agreement SP4652-4752 01-MAY-2007                | Levelled ridge and furrow is faintly visible in the field to the west of Fir Tree House as cropmarks on vertical aerial photographs of 2007.  |
|                  |   | 8950/0/7  | MD / PM | Ridge and furrow                 | E        | HS2 LiDAR 2012  | Ridge and furrow is visible as both extant and levelled earthworks across a series of paddocks to the south-west of Spella Bungalow. The majority of the extant earthworks are very well-preserved.   |
|                  |   | 8950/0/7  | MD / PM | Ridge and furrow                 | E / C    | HS2 LiDAR 2012 / HS2 Hyperspectral 2012 (Run 20b Bands 4, 5, 6) | Ridge and furrow is visible as both extant and levelled earthworks across a series of paddocks to the south-west of Spella Bungalow. The majority of the extant earthworks are very well-preserved.   |
| O84              | N/A   | 8950/0/13 | MD / PM | Ridge and furrow                 | E        | HS2 LiDAR 2012  | Ridge and furrow is visible as earthworks in the field to the south-west of The Three Ways. Partly recorded by the Northamptonshire national mapping programme. Continues across the rest of the field to the north-east, but this is   |

| Aerial Survey ID | National record of the historic environment | HER | Period  | Type                             | Evidence | Source  | Description  |
|------------------|---|-----|---------|----------------------------------|----------|---|--|
|                  |   |     |         |                                  |          |   | beyond both the survey boundary and LiDAR coverage   |
|                  |   |     |         |                                  |          |   | Ridge and furrow is visible as earthworks in the field to the south-west of The Three Ways. Partly recorded by the Northamptonshire national mapping programme. Continues across the rest of the field to the north-east, but this is beyond both the survey boundary and LiDAR coverage |
|                  |   |     |         |                                  |          |   | Three separate areas of ridge and furrow, all on different alignments, are visible as cropmarks in the field to the north-west of Spella House.  |
| O85              | N/A   | N/A | MD / PM | Ridge and furrow                 | C        | Pan-Government Agreement SP4652-3 01-MAY-2007     | Levelled ridge and furrow is visible as cropmarks in a field to the north-west of Spella Bungalow.   |
|                  |   |     |         |                                  |          | HS2 Hyperspectral 2012 (Run 21b Bands 13, 14, 15) | Levelled ridge and furrow is visible as faint cropmarks on hyperspectral imagery.  |
| O86              | N/A   | N/A | MD / PM | Ridge and furrow                 | C        | Pan-Government Agreement SP4653 01-MAY-2007       | Levelled ridge and furrow is visible as cropmarks in the field to the south-west of Fox Covert. Continues to the south-west across the rest of the field beyond the project boundary (not mapped).   |
|                  |   |     |         |                                  |          | C / E   | HS2 Vertical Photography SP4653 2012 / HS2 LiDAR 2012  |
| O87              | N/A   | N/A | MD / PM | Ridge and furrow                 | C        | HS2 Vertical Photography SP4653 2012              | Levelled ridge and furrow is just visible as cropmarks in the field to the south-east of Fox Covert.   |
|                  |   |     |         |                                  |          | Pan-Government Agreement SP4653 01-MAY-2007       | Levelled ridge and furrow is visible as cropmarks in the southern end of the field to the north of Fox Covert. Continues to the north, but not mapped beyond survey boundary.  |
|                  |   |     |         |                                  |          | HS2 Hyperspectral 2012 (Run 20b Bands 16, 9, 4)   | Ridge and furrow is very faintly visible as cropmarks on hyperspectral imagery. The cropmarks are more strongly visible at the southern boundary of the field. Continues to the north, but not mapped beyond project boundary.   |
| O88              | N/A   | N/A | PM / UN | Extractive pit / natural feature | E        | HS2 LiDAR 2012                                    | A possible post-medieval extractive pit is visible as a shallow hollow on LiDAR. Not recorded on historic OS maps. May alternatively be a natural feature such as a doline (underlying bedrock is Northampton Sand Formation).   |
| O89              | N/A   | N/A | PM / UN | Extractive pit / quarry          | E        | HS2 LiDAR 2012                                    | A probable large extractive pit is visible on LiDAR as a shallow, sub-square depression in a field on the southern side of Culworth Road. Not recorded on historic OS maps.  |

## 2.6 Results: interpretation

2.6.1 Eighty-nine possible archaeological features were recorded from the remote sensed imagery surveyed as part of this project.

2.6.2 A possible double-ditched Bronze Age round barrow is visible as concentric semi-circular cropmarks just to the north-east of Greatworth (feature O19). The interpretation of this feature is tentative, however, as the cropmarks may alternatively be explained as tractor tracks, as seen elsewhere in this field. There are, however, factors which favour an archaeological origin:

- the vehicle marks elsewhere in the field are light in colour, whereas the feature O19 marks are dark;
- the vehicle marks elsewhere in the field clearly circle around telegraph poles, posts and trees, etc. There does not seem to be such an object in the centre of feature O19 for a vehicle to have needed to circle around and create circular marks;
- the parallel vehicle marks elsewhere in the field are approximately 1m–2m apart, whereas the feature O19 concentric marks display a 2m interval. While it is possible that the feature O19 marks were made by a different vehicle, there are no observable 2m-spaced tracks leading up to them; and
- the O19 marks are faintly visible on two different remote sensed sources, taken at different times (2012 vertical orthophotography and hyperspectral imagery). This suggests that the marks are something more than transient modern agricultural marks.

2.6.3 A second possible Bronze Age round barrow (feature O09) is visible as a dark circular cropmark approximately 480m east of feature O19. As with feature O19, a range of other possible explanations for the origin of this mark cannot be discounted. In this instance, the proximity to farm buildings raises the possibility that feature O09 represents a disused horse-exercising circle.

2.6.4 Edcote Roman villa (scheduled monument 1006616) was within the study area, but the survey recorded no features clearly associated with this settlement. A curvilinear feature and two pits (feature O56) were noted to the west of the villa site and it is possible that these features are indicative of Roman activity. It is also possible, however, that they represent post-medieval quarrying.

2.6.5 The extant earthworks of a probable deserted medieval settlement (feature O17) are visible to the south-east of Thorpe Mandeville. This site was mapped previously for the Northamptonshire national mapping programme, but it was re-transcribed as part of the present survey due to the much greater level of detail and accuracy provided by the recent high-resolution LiDAR. The earthworks recorded at this site included:

- trackways or hollow ways, boundary banks and possible building platforms in the main part of the site;
- a series of rectilinear banks on the eastern side of the site, leading towards a stream. These may represent either toft and croft remains or a series of fishponds;

- a previously-unrecorded square, banked enclosure on the northern side of the main settlement area. There are traces of an external ditch in places, suggesting that this may be the remains of a moated site. This feature is only very faintly visible on LiDAR; and
- faintly extant ridge and furrow (feature O18) visible on LiDAR apparently overlying the possible moated site discussed above. This may explain the moated site's highly-degraded appearance.

2.6.6 Further earthworks recorded in the vicinity of Thorpe Mandeville included a possible medieval dam and fishpond (feature O25) lying to the north of the settlement.

2.6.7 The earthwork remains of a further shrunken medieval settlement (feature O78) were recorded on the south-western fringes of Lower Boddington. These remains comprised boundaries, building platforms and hollow ways.

2.6.8 The survey recorded numerous areas of extant and flattened ridge and furrow dating to the medieval or early post-medieval periods.

2.6.9 The survey recorded the earthwork remains of a number of former field boundaries. Most of these are likely to be medieval or post-medieval in date, but several of the boundaries were overlain by ridge and furrow, indicating that they are from field systems pre-dating the medieval period.

2.6.10 The survey noted the presence of a mound (feature O26) to the east of Lower Thorpe Farm. This mound is a scheduled monument (number 1010435; Lower Thorpe bowl barrow) and has been interpreted variously as a bowl barrow and a windmill mound. The present survey shows the mound apparently sitting on top of extant ridge and furrow earthworks, indicating that it has post-medieval origins.

2.6.11 A Second World War airfield dispersed site (feature O62) is visible on LiDAR as a series of structures beneath the trees of Calves Close Spinney, which lies north-east of Chipping Warden and south-east of the former Chipping Warden Airfield. Two typical blast shelters were visible at the edge of the trees on aerial photographs, and a number of rectangular buildings (or their remaining hard-standings) were visible beneath the trees on the LiDAR. A handful of these buildings had been recorded previously, either in the HER or on the modern OS map, although the LiDAR helped to reveal the full extent of the site.

## 2.7 Conclusions

2.7.1 Eighty-nine individual or grouped possible archaeological features were identified by the survey, 69 of which are not recorded by either the HER or the national record of the historic environment. These features include:

- cropmarks indicating the presence of two possible Bronze Age round barrows;
- a curvilinear feature and two pits, possibly associated with the scheduled Roman settlement at Edcote (scheduled monument 1006616);
- earthworks of pre-medieval field boundaries;
- earthworks associated with shrunken/deserted medieval settlements at Thorpe Mandeville and Lower Boddington;

- possible dam and fishpond earthworks in the vicinity of Thorpe Mandeville;
- numerous areas of extant and flattened ridge and furrow;
- medieval and post-medieval field boundary earthworks; and
- features at Calves Close Spinney associated with the nearby Second World War airfield.

2.7.2 A mound to the east of Lower Thorpe Farm is scheduled as a possible Bronze Age barrow (schedule monument 1010435). The survey has demonstrated that this feature apparently overlies an area of ridge and furrow and may therefore be post-medieval in origin.

## 2.8 References

Blom (2012), *HS2 Hyperspectral Information*, BLOM Project Number: 03/037/12.

British Geological Survey (BGS) (2012), *Digital Geological Map of Great Britain (DiGMapGB-10) at 1:10 000 scale, for bedrock geology and superficial deposits*, Digital Data Licence No. 2012/062.

Deegan, A. (1992), *Mapping Ancient Landscapes in Northamptonshire Northamptonshire NMP Project: management report*, English Heritage and Northamptonshire County Council, Unpublished Report.

Deegan, A. and Foard, G. (2007), *'Mapping Ancient Landscapes in Northamptonshire*, English Heritage, Swindon

English Heritage; NMR Monument Type Thesaurus; [http://thesaurus.english-heritage.org.uk/thesaurus.asp?thes\\_no=1](http://thesaurus.english-heritage.org.uk/thesaurus.asp?thes_no=1); Accessed: August 2012 - June 2013.

GeoStore; Aerial Photography RGB Product; <http://www.geostore.com/geostore4/WebStore?xml=geostore4/xml/productsAPRGB.xml>; Accessed: August 2013.

Ordnance Survey; Products and Services FAQs: How accurate are your products?; <http://www.ordnancesurvey.co.uk/oswebsite/support/products-services.html>; Accessed: June 2013.

Powlesland, D., Lyall, J. and Donoghue, D. (1997), *Enhancing the record through remote sensing: the application and integration of multi-sensor, non-invasive remote sensing techniques for the enhancement of the Sites and Monuments Record*, Internet Archaeology 2; <http://dx.doi.org/10.11141/ia.2.4>; Accessed: 18/12/2012.

Winton, H. (2012), *Standards for National Mapping Programme projects, Version 0.1 Drafts*, English Heritage, Aerial Investigation and Mapping, Typescript document.

## 2.9 Historic aerial photographs consulted

Table 5: English Heritage vertical aerial photographs consulted for the remote sensing survey of the Greatworth to Lower Boddington study area

| English Heritage library number | Original sortie number | Original frame number | Date taken      |
|---------------------------------|------------------------|-----------------------|-----------------|
| SP 5345 / 3                     | NMR 21536              | / 11                  | 03 January 2002 |
| SP 5345 / 4                     | NMR 21078              | / 18                  | 03 January 2002 |
| SP 5346 / 6                     | NMR 24292              | / 07                  | 14 July 2006    |
| SP 5346 / 7                     | NMR 24292              | / 06                  | 14 July 2006    |
| SP 5346 / 8                     | NMR 24359              | / 14                  | 14 July 2006    |

|              |           |      |                  |
|--------------|-----------|------|------------------|
| SP 5346 / 9  | NMR 24359 | / 15 | 14 July 2006     |
| SP 5148 / 38 | NMR 26870 | / 34 | 03 February 2011 |
| SP 5148 / 39 | NMR 26870 | / 35 | 03 February 2011 |
| SP 5148 / 40 | NMR 26870 | / 36 | 03 February 2011 |
| SP 5148 / 41 | NMR 26870 | / 37 | 03 February 2011 |
| SP 5148 / 42 | NMR 26870 | / 38 | 03 February 2011 |
| SP 5047 / 32 | NMR 26947 | / 17 | 04 May 2011      |
| SP 5047 / 40 | NMR 26947 | / 32 | 04 May 2011      |
| SP 5047 / 41 | NMR 26947 | / 33 | 04 May 2011      |
| SP 5047 / 42 | NMR 26947 | / 34 | 04 May 2011      |
| SP 5048 / 9  | NMR 26947 | / 01 | 04 May 2011      |
| SP 5048 / 10 | NMR 26947 | / 15 | 04 May 2011      |
| SP 5048 / 11 | NMR 26947 | / 16 | 04 May 2011      |
| SP 5048 / 12 | NMR 26947 | / 25 | 04 May 2011      |
| SP 5048 / 13 | NMR 26948 | / 16 | 04 May 2011      |
| SP 5048 / 14 | NMR 26948 | / 17 | 04 May 2011      |
| SP 5048 / 16 | NMR 26948 | / 19 | 04 May 2011      |
| SP 5048 / 17 | NMR 26948 | / 20 | 04 May 2011      |
| SP 5048 / 18 | NMR 26948 | / 21 | 04 May 2011      |
| SP 5048 / 19 | NMR 26948 | / 22 | 04 May 2011      |
| SP 5048 / 20 | NMR 26948 | / 23 | 04 May 2011      |
| SP 5048 / 21 | NMR 26948 | / 24 | 04 May 2011      |
| SP 5048 / 22 | NMR 26948 | / 25 | 04 May 2011      |
| SP 5147 / 8  | NMR 26947 | / 26 | 04 May 2011      |
| SP 5147 / 9  | NMR 26947 | / 27 | 04 May 2011      |
| SP 5147 / 10 | NMR 26947 | / 28 | 04 May 2011      |
| SP 5148 / 43 | NMR 26947 | / 29 | 04 May 2011      |
| SP 5148 / 44 | NMR 26947 | / 30 | 04 May 2011      |
| SP 5148 / 45 | NMR 26947 | / 31 | 04 May 2011      |
| SP 5148 / 46 | NMR 26947 | / 35 | 04 May 2011      |
| SP 5148 / 47 | NMR 26947 | / 36 | 04 May 2011      |
| SP 5148 / 48 | NMR 26947 | / 37 | 04 May 2011      |
| SP 5148 / 49 | NMR 26947 | / 38 | 04 May 2011      |

|              |           |      |             |
|--------------|-----------|------|-------------|
| SP 5148 / 50 | NMR 26947 | / 39 | 04 May 2011 |
| SP 5148 / 51 | NMR 26947 | / 40 | 04 May 2011 |
| SP 5148 / 52 | NMR 26947 | / 41 | 04 May 2011 |
| SP 5148 / 53 | NMR 26947 | / 42 | 04 May 2011 |
| SP 5148 / 54 | NMR 26947 | / 43 | 04 May 2011 |
| SP 5148 / 55 | NMR 26947 | / 44 | 04 May 2011 |
| SP 5148 / 56 | NMR 26947 | / 45 | 04 May 2011 |
| SP 5148 / 57 | NMR 26948 | / 04 | 04 May 2011 |
| SP 5148 / 58 | NMR 26948 | / 05 | 04 May 2011 |
| SP 5148 / 59 | NMR 26948 | / 06 | 04 May 2011 |
| SP 5148 / 60 | NMR 26948 | / 07 | 04 May 2011 |
| SP 5148 / 61 | NMR 26948 | / 08 | 04 May 2011 |
| SP 5148 / 62 | NMR 26948 | / 09 | 04 May 2011 |
| SP 5148 / 63 | NMR 26948 | / 10 | 04 May 2011 |
| SP 5148 / 64 | NMR 26948 | / 11 | 04 May 2011 |
| SP 5148 / 65 | NMR 26948 | / 12 | 04 May 2011 |
| SP 5148 / 66 | NMR 26948 | / 13 | 04 May 2011 |
| SP 5148 / 67 | NMR 26948 | / 14 | 04 May 2011 |
| SP 5148 / 68 | NMR 26948 | / 15 | 04 May 2011 |
| SP 5248 / 18 | NMR 26948 | / 02 | 04 May 2011 |
| SP 5248 / 19 | NMR 26948 | / 03 | 04 May 2011 |
| SP 5248 / 20 | NMR 26948 | / 01 | 04 May 2011 |
| SP 5346 / 10 | NMR 26952 | / 28 | 04 May 2011 |
| SP 5346 / 11 | NMR 26952 | / 29 | 04 May 2011 |
| SP 5346 / 12 | NMR 26952 | / 30 | 04 May 2011 |
| SP 5346 / 13 | NMR 26952 | / 31 | 04 May 2011 |
| SP 5346 / 14 | NMR 26952 | / 32 | 04 May 2011 |
| SP 5542 / 10 | NMR 26952 | / 33 | 04 May 2011 |
| SP 5542 / 11 | NMR 26952 | / 34 | 04 May 2011 |
| SP 5542 / 12 | NMR 26952 | / 35 | 04 May 2011 |
| SP 5542 / 13 | NMR 26952 | / 36 | 04 May 2011 |
| SP 5542 / 14 | NMR 26952 | / 37 | 04 May 2011 |
| SP 5542 / 15 | NMR 26952 | / 38 | 04 May 2011 |

## 2.10 Figures

CH-004-15.01 Remote sensing survey interpretation 1:5,000  
 CH-004-15.02 Remote sensing survey interpretation 1:5,000  
 CH-004-15.03 Remote sensing survey interpretation 1:5,000  
 CH-004-15.04 Remote sensing survey interpretation 1:5,000  
 CH-004-15.05 Remote sensing survey interpretation 1:5,000  
 CH-004-15.06 Remote sensing survey interpretation 1:5,000  
 CH-004-15.07 Remote sensing survey interpretation 1:5,000  
 CH-004-15.08 Remote sensing survey interpretation 1:5,000  
 CH-004-15.09 Remote sensing survey interpretation 1:5,000  
 CH-004-15.10 Remote sensing survey interpretation 1:5,000  
 CH-004-15.11 Remote sensing survey interpretation 1:5,000  
 CH-004-15.12 Remote sensing survey interpretation 1:5,000

### 3 Geophysical surveys

#### 3.1 Site OUoAB: Greatworth Hall (GLB213)

##### Introduction

3.1.1 A geophysical survey was conducted over a predefined area at Greatworth (national grid reference SP 5600 4280). The aim of the survey was to locate and characterise any anomalies of possible archaeological interest within the site.

3.1.2 The site lies to the south of the B4525, approximately 0.5km north-east of Greatworth Village, in the parish of Greatworth, South Northamptonshire District (Figure. CH004.15.13; GLB213). The survey area encompassed four fields, of which access was only granted to one (Area 1; Figure CH004.15.14). This field consisted of rough pasture, with sporadic trees and small areas of dense vegetation. The land within the field sloped down from west to east. It measured approximately 1.7ha in area.

3.1.3 The site's bedrock geology is recorded as sandstones, limestones and ironstones of the Taynton Limestone Formation, Horsehay Sand Formation and Northampton Sand Formation. There are no superficial deposits recorded<sup>19</sup>. The soils in the area are classified as well-drained calcareous fine loamy deposits of the Aberford (511a) association<sup>20</sup>.

##### Methodology

3.1.4 The survey was in accordance with a written scheme of investigation<sup>21</sup>. All survey grid positioning was carried out using Trimble R8 Real Time Kinematic (RTK) VRSNow equipment. The geophysical survey area was georeferenced relative to the OS National Grid by tying in to local detail and corrected to the mapping provided by the client. These tie-ins are presented in Figure CH004.15.18. Please refer to this diagram when re-establishing the grid or positioning trenches.

3.1.5 The magnetometer survey was carried out with Bartington Grad 601-2 fluxgate gradiometers, collecting data every 0.25m along traverses 1m apart. Data processing has been performed as appropriate using an in-house software package (GeoSub) employing the following processing steps: zero mean sensor, step correction (de-stagger) and interpolation (on the Y axis). All survey work was carried out in accordance with the current English Heritage guidelines<sup>22</sup>.

3.1.6 Data are presented as greyscale and XY trace plots (Figure CH004.15.17). The former allows simple feature identification and basic interpretation whilst the latter allows for analysis of the shape of the individual anomalies in order to better characterise the recorded responses.

##### Limitations

3.1.7 Magnetic survey is an exceedingly effective technique for site evaluation, providing fast data acquisition and responding, to some degree, to the majority of archaeological site types.

3.1.8 The technique relies upon enhancement of naturally occurring iron-bearing compounds in the soil caused by anthropogenic activity. Detection rates can be poor where archaeological sites have seen only temporary and/or sporadic occupation or where there is insufficient activity to drive the enhancement; this is often true of lithic-era sites.

3.1.9 Success may also be limited over soils that are deficient in iron compounds, providing little material to be subject to enhancement. Conversely, the strength of response from soils and geological units which are naturally magnetic, for example igneous formations and soils derived thereof, may mask any subtler archaeological enhancement within.

3.1.10 The presence of ferrous structures either above or below ground (buildings, pylons, fences, pipes, etc.) will produce very strong magnetic fields which will extend far beyond their physical footprint. The strength of these magnetic 'shadows' is such that they will mask practically any archaeological anomalies. Similarly, later features and demolition spreads or imported consolidation material can produce areas of magnetic disturbance that will mask underlying features.

3.1.11 As a general rule, the Bartington Grad601 instruments allow for a depth of investigation of approximately 1m, depending on the strength of the field produced by the buried feature; below this depth, only particularly enhanced material will be detected with any kind of confidence.

3.1.12 The general conditions for the field surveyed were good, the land sloping gently from west to east and covered by short grass. Although sheep were present at the time of the survey, they did not cause any obstruction to the work carried out. Small gaps within the collected data are the result of substantial trees precluding data collection.

##### Assumptions

3.1.13 All of the fields contain small-scale ferrous anomalies, most clearly represented by sharp 'spikes' in the XY trace plots. These are typically assumed to be modern debris within the topsoil, unless the site type or a priori knowledge suggests otherwise.

##### Results: description

3.1.14 See Figures CH004.15.15–16. The survey is dominated by a few very strong magnetic responses; these large halos mask much of the survey area. The survey area is also bounded by a continuous area of ferrous response. Mottled anomalies, weaker in their magnetic strength, are in evidence in the northern end of the survey area. A singular, linear, weak positive magnetic trend has also been identified towards the eastern edge of the survey area.

##### Results: interpretation

3.1.15 See Figure CH004.15.16. No anomalies of an archaeological origin have been identified within the survey results.

3.1.16 A pipe crosses the survey on an approximate east/west orientation. To the south of this pipe, a strong magnetic response is due to the presence of a telegraph pole, while the responses around the limits of the survey have been caused by ferrous boundaries and modern interference.

3.1.17 Natural anomalies reflecting changes within the pedological nature of the topsoil have been identified due to their characteristic mottled effect within the greyscale. A single positive

<sup>19</sup> British Geological Survey; Geology of Britain Viewer; <http://mapapps.bgs.ac.uk/geologyofbritain/home.html>; Accessed: 10 July 2013.

<sup>20</sup> Soil Survey of England and Wales (1983), *Soils of England and Wales, Sheet 3: Midland and Western England*.

<sup>21</sup> Cotswold Archaeology (2013), *HS2 Northamptonshire: Written Scheme of Investigation for Geophysical and Metal Detecting Surveys*.

<sup>22</sup> English Heritage (2008), *Geophysical Survey in Archaeological Field Evaluation*.

trend may point to a soil-filled feature; its isolated nature, however, is indicative of a natural or agricultural origin.

### Conclusions

3.1.18 No anomalies of an archaeological origin were detected within the survey area. A pipe, boundaries and a telegraph pole all had a marked effect on the data. A small collection of amorphous anomalies is likely to have a natural origin.

## 3.2 Site OUoAC: Greatworth

### Introduction

3.2.1 An archaeological geophysical survey was undertaken at a site located to the north of Greatworth Park, Greatworth, Northamptonshire (site code OUoAC; Figure CH004.15.19). The aim of the survey was to locate and characterise any anomalies of possible archaeological interest within the site.

#### The site

3.2.2 The survey area is located at national grid reference SP 5510 4380, immediately north of the B4525 Helmdon Road. It comprises three fields and is approximately 15.48ha in extent (Figure CH004.15.20). The western and central fields (Fields 1 and 2) were under cereal crop at the time of the survey and the eastern field (Field 3) was pasture.

3.2.3 The survey area stands at an elevation of between 165m and 172m AOD (above Ordnance Datum) on a slight, north-eastward facing slope. It is underlain by mid Pleistocene Till which masks deposits of Horsehay Sand, Northampton Sand and Whitby Mudstone<sup>23</sup>.

#### Summary historic/archaeological background

3.2.4 The site is within an area with high potential for prehistoric, Roman and early medieval remains. Nearby archaeological investigations have recorded an undated ditch in the field to east of the survey area<sup>24</sup> and small undated quarry pits at Stuchbury Manor Farm<sup>25</sup>. Nevertheless a previous geophysical investigation undertaken along the southern edge of the survey area prior to the insertion of a water pipeline recorded no archaeological anomalies<sup>26</sup>.

3.2.5 The RAF Greatworth wireless transmission station (which was constructed during the Second World War) lay to the immediate south of the site, within Greatworth Park<sup>27</sup>.

### Methodology

3.2.6 A detailed magnetometer survey of the site was undertaken on 3–5 June 2013.

3.2.7 The survey was in line with a written scheme of investigation<sup>28</sup>. An independent network of 30m grid squares was established within each of the fields to be surveyed. Each grid was laid

<sup>23</sup> British Geological Survey, GeoIndex; <http://mapapps2.bgs.ac.uk/geoindex/home.html>; Accessed: 25 July 2013.

<sup>24</sup> Northamptonshire Historic Environment Record, No. 3319.

<sup>25</sup> Northamptonshire Historic Environment Record, No. 7986.

<sup>26</sup> Clements, P. (2007), Archaeological geophysical survey: Thorpe Mandeville to Greatworth pipeline Northamptonshire, *Northamptonshire Archaeology report*. No. 07/200.

<sup>27</sup> Northamptonshire Historic Environment Record, No. 7059/1

<sup>28</sup> Cotswold Archaeology (2013).

out with a tape measure and optical square and was tied in to the OS National Grid by recording the baseline location with a Leica Systems 1200 differential global positioning system (Figure CH004.15.21).

3.2.8 The survey data was collected with Bartington Grad 601-2, twin sensor array, vertical component fluxgate gradiometers. These are standard instruments for archaeological survey, capable of resolving magnetic field strength to a precision of 0.1 nanoTesla<sup>29</sup>. The instruments were carried at a brisk but steady pace through each grid square, collecting data along 1m-spaced traverse lines. Measurements were automatically triggered every 0.25m along the traverses, giving a total of 3,600 measurements per square.

3.2.9 The survey data was viewed and processed using Geoplot 3.00v software. Striping, caused by slight mismatches in sensor balance, was removed using the 'Zero Mean Traverse' function and destaggering of the data was performed as necessary. Greyscale bitmaps of the data (scale +/- 4 nanoTesla, black/white) were exported and were georectified using the RasTools function in MapInfo v8. XY trace plots of the data were not produced, as they were not considered to be appropriate in this instance.

### Limitations

3.2.10 Magnetometer survey is a useful and widely-deployed form of archaeological prospection but it suffers from several well-recognised limitations<sup>30</sup>:

- it is a shallow-seeking technique and is generally unable to detect archaeology beneath more than 1m of overburden;
- small and ephemeral remains (e.g. postholes, beam slots, cremation burials) are rarely detected, especially at the standard survey resolution of 1m x 0.25m;
- stone building remains can only be detected under particularly favourable conditions;
- the technique can be ineffective over certain geological substrates which do not support the formation of well-developed contrasts in soil magnetism. It may also be hindered by highly magnetic geologies (e.g. ironstone, igneous dykes); and
- certain modern structures (e.g. fences, steel-framed buildings, water pipes) produce intense magnetic halos which can obscure the much weaker anomalies arising from archaeological remains.

### Assumptions

3.2.11 There are no methodological assumptions applicable to the conduct of this fieldwork. Readers should be aware, however, that the interpretation of archaeological geophysical data is a qualitative process based on a combination of theoretical principles and past experience and that absolute confidence is not always achievable.

### Results: description

3.2.12 Please refer to Figures CH004.15.22–23. The data sets from Fields 1 and 3 contain a few moderately large dipolar anomalies but are otherwise dominated by magnetic 'noise'. This

<sup>29</sup> Bartington, G. and Chapman, C. (2003), A high-stability fluxgate magnetic gradiometer for shallow geophysical survey applications, *Archaeological Prospection*, Vol. 11, Pgs. 19–34.

<sup>30</sup> English Heritage (2008).

|        |   |  |
|--------|---|--|
|        | <p>consists of very dense scatters of small positive and negative anomalies, the majority of which do not exceed 30 nanoTesla in strength. In Field 3 these anomalies are especially concentrated in ill-defined north/south bands, and in two other bands lying parallel to the northern and southern field boundaries.</p>  |  |
| 3.2.13 | <p>The data from Field 2, which is less magnetically disturbed, contains two sets of parallel linear anomalies. One set comprises closely-spaced, weakly positive anomalies aligned approximately north/south. The other comprises weak anomalies of alternating magnetic polarity arranged into a herringbone pattern. A substantial number of small and medium-sized dipolar anomalies are also present within the data.</p>  |  |
|        | <p><b>Results: interpretation</b></p>   |  |
| 3.2.14 | <p>The magnetic noise which dominates Fields 1 and 3 is likely to represent a dense scatter of small ferrous objects introduced onto the field during the spreading of contaminated 'green waste.' As no such noise is apparent in the data collected in 2007, it would appear that spreading took place after this date. The patterning apparent in Field 3 probably reflects the uneven distribution of this material, with concentrations along the tramlines followed by the spreader.</p>                                      |  |
| 3.2.15 | <p>The set of positive linear anomalies in Field 2 probably represents ploughed-out ridge and furrow of medieval origin. The herringbone pattern of anomalies in the same field is highly diagnostic of modern (19th century or later) field drains.</p>  |  |
| 3.2.16 | <p>The dipolar anomalies which occur across the survey area are diagnostic of ferrous objects. The moderately large examples along the southern edge of the area are not apparent in the 2007 survey data, and it is very likely that they relate to the recently-inserted water pipeline. The pipe itself has not been detected (presumably because it is plastic), but the anomalies may either represent metal elements associated with the pipe (e.g. collars) or items of scrap buried in the backfill of the pipe trench.</p> |  |
|        | <p><b>Conclusions</b></p>   |  |
| 3.2.17 | <p>It appears that two of the three fields within the survey area have been covered with contaminated 'green waste.' This has given rise to excessive levels of magnetic noise which may have masked any archaeological features that might be present.</p>   |  |
| 3.2.18 | <p>In Field 2, which was much less affected by magnetic noise, the survey has detected medieval ridge and furrow and field drains of modern date (i.e. 19th century or later). A few ferrous anomalies along the southern edge of Fields 1, 2 and 3 are thought to relate to a recently-inserted water pipe.</p>  |  |
| 3.3    | <p><b>Site CHoAC: Lower Thorpe Farm (GLBo85)</b></p>  |  |
|        | <p><b>Introduction</b></p>  |  |
| 3.3.1  | <p>An archaeological geophysical survey was undertaken at a site located at Lower Thorpe Farm, Northamptonshire (site code CHoAC; Figure CH004.15.24; GLBo85). The aim of the survey was to locate and characterise any anomalies of possible archaeological interest within the site.</p>  |  |
|        |   | <p><b>The site</b></p>   |
| 3.3.2  |   | <p>The hamlet of Lower Thorpe is located between the villages of Culworth and Thorpe Mandeville and comprises a cluster of farm buildings and other dwellings (national grid reference SP 5354 4547; Figure CH004.15.25). The survey area consisted of two detached blocks of land (Fields 1 and 2), with a combined area of circa 1.5ha. Field 1 was a small pasture field on the south-eastern side of the hamlet. Field 2 lay within a hay meadow located immediately to the north-west of Lower Thorpe.</p>  |
| 3.3.3  |   | <p>Lower Thorpe is situated in the base of a small valley which drains northwards into the River Cherwell. The underlying geology is Whitby Mudstone with small outcrops of Horsehay Sand Formation Sandstone, Northampton Sand Formation Ironstone and Taynton Limestone Formation Ooidal Limestone at the east and west.<sup>31</sup></p>  |
|        |   | <p><b>Summary historic/archaeological background</b></p>   |
| 3.3.4  |   | <p>A number of medieval and post-medieval features occur in the vicinity of the survey site. A probable medieval windmill mound<sup>32</sup> (also previously interpreted as a prehistoric bowl barrow)<sup>33</sup> lies approximately 100m to the north of the survey areas. An earthwork interpreted as a mill leat forms the northern boundary of Field 1<sup>34</sup>. A series of three 18th-century ponds supply water to the adjacent leat and are interpreted as features used for the breeding of wild waterfowl or boating.<sup>35</sup> Remains of other medieval waterworks are concentrated around the village of Thorpe Mandeville, which lies to the south-west of the survey areas. Ridge and furrow cultivation earthworks are located to the south, east and west of the survey areas<sup>36</sup>.</p> |
|        |   | <p><b>Methodology</b></p>  |
| 3.3.5  |   | <p>A detailed magnetometer survey of the site was undertaken on 7 June 2013.</p>   |
| 3.3.6  |   | <p>The survey was in line with a written scheme of investigation<sup>37</sup>. An independent network of 30m grid squares was established within each of the fields to be surveyed. Each grid was laid out with a tape measure and optical square and was tied in to the OS National Grid by recording the baseline location with a Leica Systems 1200 differential global positioning system. Calibration measurements were taken to re-locatable points of hard detail (Figure CH004.15.26).</p>   |
| 3.3.7  |   | <p>The survey data was collected with Bartington Grad 601-2, twin sensor array, vertical component fluxgate gradiometers. These are standard instruments for archaeological survey, capable of resolving magnetic field strength to a precision of 0.1 nanoTesla<sup>38</sup>. The instruments were carried at a brisk but steady pace through each grid square, collecting data along 1m-spaced traverse lines. Measurements were automatically triggered every 0.25m along the traverses, giving a total of 3,600 measurements per square.</p>   |
| 3.3.8  |   | <p>The survey data was viewed and processed using Geoplot 3.00v software. Striping, caused by slight mismatches in sensor balance, was removed using the 'Zero Mean Traverse' function</p>   |

<sup>31</sup> British Geological Survey, 'GeoIndex,' <http://mapapps2.bgs.ac.uk/geoindex/home.html> Accessed: 24 July 2013

<sup>32</sup> Northamptonshire Historic Environment Record No. 253/1/1

<sup>33</sup> Northamptonshire Historic Environment Record No. 5838/0/1

<sup>34</sup> Northamptonshire Historic Environment Record No. 253/2/3

<sup>35</sup> Northamptonshire Historic Environment record No. 224

<sup>36</sup> Northamptonshire Historic Environment Record No. 6642/0/5

<sup>37</sup> Cotswold Archaeology, (2013)'

<sup>38</sup> Bartington, G. and Chapman, C.,(2003)

|   |        |  |
|---|--------|--|
| and destaggering of the data was performed as necessary. Greyscale bitmaps of the data (scale +/- 4 nanoTesla, black/white) were exported and were georectified using the RasTools function in MapInfo v8. XY trace plots of the data were not produced, as they were not considered to be appropriate in this instance.  | 3.3.13 | <b>Results: interpretation</b><br>The concentration of dipolar anomalies in the eastern part of the Field 1 suggest that this area contains a considerable amount of ferrous debris, and perhaps also brick rubble. Some of this material could be derived from the derelict boathouse in the north-eastern corner of the field, but some may be imported material incorporated into the make-up of the mill-pond dam. The chain of dipolar anomalies leading to the boathouse probably represents a pipeline.   |
| <b>Limitations</b><br>3.3.9 Magnetometer survey is a useful and widely-deployed form of archaeological prospection, but it suffers from several well-recognised limitations <sup>39</sup> :   | 3.3.14 | The amorphous positive anomalies in the southern half of Field 1 are typical of those which occur in areas of alluviated ground. Some have roughly curvilinear forms, suggesting that they may represent small, abandoned meanders of the adjacent stream.   |
| <ul style="list-style-type: none"> <li>• it is a shallow-seeking technique and is generally unable to detect archaeology beneath more than 1m of overburden;</li> <li>• small and ephemeral remains (e.g. postholes, beam slots, cremation burials) are rarely detected, especially at the standard survey resolution of 1m x 0.25m;</li> <li>• stone building remains can only be detected under particularly favourable conditions;</li> <li>• the technique can be ineffective over certain geological substrates which do not support the formation of well-developed contrasts in soil magnetism. It may also be hindered by highly magnetic geologies (e.g. ironstone, igneous dykes); and</li> <li>• certain modern structures (e.g. fences, steel-framed buildings, water pipes) produce intense magnetic halos which can obscure the much weaker anomalies arising from archaeological remains.</li> </ul> | 3.3.15 | The linear anomalies in the northern half of Field 1 lie parallel with the embankment that forms the downslope side of the mill leat. Although their precise cause is unknown, it seems reasonable to presume that they relate in some way to this earthwork.  |
| <b>Assumptions</b><br>3.3.10 There are no methodological assumptions applicable to the conduct of this fieldwork. Readers should be aware, however, that the interpretation of archaeological geophysical data is a qualitative process, based on a combination of theoretical principles and past experience, and that absolute confidence is not always achievable.   | 3.3.16 | The parallel linear anomalies within Field 2 correlate with surviving earthworks of medieval ridge and furrow, with the two furrow directions relating to two separate furlongs. The other linear anomaly in Field 2 probably represents a ditch. Although this ditch is of indeterminate date, it intersects with the ridge and furrow and is therefore not contemporary with it.   |
| <b>Results: description</b><br>3.3.11 Please refer to Figures CH004.15.27–28. Within Field 1, a south-west/north-east-aligned chain of dipolar anomalies runs from the stream on the southern side of the survey area to the derelict boathouse in the north-eastern corner. Around the boathouse, and southwards along the edge of the adjacent pond, there are zones of magnetically-disturbed data with a large number of small dipolar anomalies. Some amorphous positive anomalies occur in the southern half of the field, in a band alongside the stream, and a band of weaker, linear, positive anomalies runs parallel to the leat in the north.   | 3.3.17 | The zone of dipolar anomalies in the west of the survey area indicates a concentrated deposit of ferrous debris and possibly also ceramic material (brick rubble or burnt soil). Whilst this could represent the site of a small, demolished structure, it is more likely in this case to represent backfill materials within a former quarry pit. There is no map evidence for such a feature, but an aerial photograph <sup>40</sup> of the site shows that these anomalies coincide with an area where the field surface appears to be disturbed.   |
| 3.3.12 The data from Field 2 contains broad, parallel, weakly magnetic linear anomalies aligned north-north-west/south-south-east across the majority of the survey area, with similar anomalies on a perpendicular alignment in the south-western corner. These are intersected by a single positive linear anomaly aligned north-east/south-west. A rectilinear zone of dipolar anomalies occurs at the western edge of the survey area and occasional weak positive anomalies occur sporadically at the north.   | 3.3.18 | <b>Conclusions</b><br>The survey results correlate broadly with the archaeological earthworks existing at Lower Thorpe. To the south-east of the hamlet, in Field 1, the survey has detected slight responses apparently associated with the extant canalised leat at the site. This leat is fed by a series of ponds which may have had a medieval origin. It is possible that the leat served to power a mill or other industry (perhaps a forge/bloomery) within the steep valley bottom at Lower Thorpe. The leat also forms part of the historic landscape of the 17th-century, Grade II listed Lower Thorpe Farmhouse. A zone of alluvial anomalies which may represent cut-off meanders was also recorded in this area of the site. |
|   | 3.3.19 | In Field 2, anomalies indicative of medieval ridge and furrow were recorded. Although the landscape around Lower Thorpe is principally a construct of post medieval enclosure, some aspects of the medieval landscape survive, and areas of extant ridge and furrow are still clearly visible in the surrounding fields.   |
|   | 3.3.20 | A possible post-medieval quarry pit was recorded in Field 2. This pit is one of a number of quarries disrupting the medieval ridge and furrow in this area.  |
|   | 3.3.21 | The date and nature of the possible ditch detected in Field 2 are unknown.   |

<sup>39</sup> English Heritage (2008).<sup>40</sup> Google Earth aerial photograph, nominal date 31 December 2006.

## 3.4 Site CHoAB: Culworth Grounds (GLB105)

### Introduction

3.4.1 An archaeological geophysical survey and a metal detecting survey was undertaken at a site located 1.5km south-west of Culworth village and 250m to the north-west of Culworth Grounds (site code: CHoAB; Figure CH004.15.29; GLB105). The aim of the survey was to locate and characterise any anomalies of possible archaeological interest within the site.

#### The site

3.4.2 The survey area is located at national grid reference SP 5290 4620 and comprises a compact block of land, approximately 32.3ha in extent, extending across four fields of mixed agricultural usage (Figure CH004.15.30). At the time of the survey, there were bean crops on Field 1 and the northern half of Field 2, long grass on Field 3 and the southern half of Field 2, and a wheat or barley crop in Field 4. Fields 2 and 3 were bisected by a horse gallop, and a belt of saplings crossed the eastern edge of Field 4.

3.4.3 The survey area is situated in an area of complex topography in the upper reaches of the Cherwell valley. It lies circa 1.7km to the south of the River Cherwell, between two north-flowing tributary streams. The north-eastern part of the area (Field 4) covers the summit of a small hill which is detached from the main body of high ground to the east. The other fields encompass the southern and western flanks of this hill and an area of lower lying ground to the west. The maximum and minimum elevations of the survey area are approximately 161m and 129m AOD.

3.4.4 The geology of the survey area comprises Whitby mudstone (Upper Lias) with a capping of Northampton sands and ironstone on the higher ground<sup>41</sup>. During the survey, two small springs were seen upwelling close to the north-western corner of Field 1.

#### Summary historic/archaeological background

3.4.5 Cropmarks indicate the presence of a D-shaped enclosure, of probable Iron Age date, on the high ground in the north-eastern part of the survey area<sup>42</sup>. No other archaeological remains are known within the area, although there are medieval and later features, including ridge and furrow, a windmill mound and watermill earthworks, to the south-east, around Lower Thorpe.<sup>43</sup>

3.4.6 It is thought that the battle of Edgcote Moor (AD 1469) was fought just to the west of the survey area<sup>44</sup>, although its precise location is not well established. The battle was a major event in the Wars of the Roses, at which the forces of the Earl of Warwick defeated forces loyal to King Edward IV.

### Methodology

#### Geophysical survey

3.4.7 A detailed magnetometer survey of the site was undertaken on 29–31 May and 3–6 June 2013.

3.4.8 The survey was in line with a written scheme of investigation<sup>45</sup>. An independent network of 30m grid squares was established within each of the fields to be surveyed. Each grid was laid out with a tape measure and optical square and was tied in to the OS National Grid by recording the baseline location with a Leica Systems 1200 differential global positioning system. Two survey pegs were left on site as GPS calibration points, as requested in the survey specification (Figure CH004.15.31).

3.4.9 The survey data was collected with Bartington Grad 601-2, twin sensor array, vertical component fluxgate gradiometers. These are standard instruments for archaeological survey, capable of resolving magnetic field strength to a precision of 0.1 nanoTesla<sup>46</sup>.

3.4.10 The instruments were carried at a brisk but steady pace through each grid square, collecting data along 1m-spaced traverse lines. Measurements were automatically triggered every 0.25m along the traverses, giving a total of 3,600 measurements per square.

3.4.11 The survey data was viewed and processed using Geoplot 3.00v software. Striping, caused by slight mismatches in sensor balance, was removed using the 'Zero Mean Traverse' function and destaggering of the data was performed as necessary. Greyscale bitmaps of the data (scale +/- 4 nanoTesla, black/white) were exported and georectified using the RasTools function in MapInfo V8. XY trace plots of the data were not produced, as they were not considered to be appropriate in this instance.

#### Metal detecting survey

3.4.12 The survey was in line with a written scheme of investigation<sup>47</sup>. The metal detecting survey was conducted with Laser 'Scout' metal detectors. It was restricted to Field 1 and the northern half of Field 2, as these were the only fields in a condition fit for survey. Long grass and tall crops on the other fields would have tangled the search heads and made it impossible to keep them sufficiently close to the ground.

3.4.13 The survey methodology required the search to be carried out along parallel 10m-spaced transects, with the width of sweep being approximately 2m. Any detected artefacts were to be recovered, providing they did not lie below plough depth, and their findspots were to be recorded with a Leica 1200 differential global positioning system. At the request of the survey co-ordinators, the metal detectors were set to discriminate against ferrous objects during the initial survey. Had the survey identified any areas of significance, a subsequent, more detailed, survey would have been undertaken without discrimination.

### Limitations

#### Geophysical survey

3.4.14 Magnetometer survey is a useful and widely-deployed form of archaeological prospection, but it suffers from several well-recognised limitations<sup>48</sup>:

- it is a shallow-seeking technique and is generally unable to detect archaeology beneath more than 1m of overburden;

<sup>41</sup> British Geological Survey; GeoIndex; <http://mapapps2.bgs.ac.uk/geoindex/home.html>; Accessed: 24 July 2013.

<sup>42</sup> Northamptonshire Historic Environment Record No. 9599.

<sup>43</sup> Northamptonshire Historic Environment Record Nos. 253 and 6642.

<sup>44</sup> Northamptonshire Historic Environment Record No. 252/1.

<sup>45</sup> Cotswold Archaeology (2013).

<sup>46</sup> Bartington, G. and Chapman, C. (2003).

<sup>47</sup> Cotswold Archaeology (2013).

<sup>48</sup> English Heritage (2008).

|        |  |                                      |  |
|--------|--|--------------------------------------|--|
|        | <ul style="list-style-type: none"> <li>small and ephemeral remains (e.g. postholes, beam slots, cremation burials) are rarely detected, especially at the standard survey resolution of 1m x 0.25m;</li> <li>stone building remains can only be detected under particularly favourable conditions;</li> <li>the technique can be ineffective over certain geological substrates which do not support the formation of well-developed contrasts in soil magnetism. It may also be hindered by highly magnetic geologies (e.g. ironstone, igneous dykes); and</li> <li>certain modern structures (e.g. fences, steel-framed buildings, water pipes) produce intense magnetic halos which can obscure the much weaker anomalies arising from archaeological remains.</li> </ul> |                                      |  |
|        | <b><i>Metal detecting survey</i></b>   |                                      |  |
| 3.4.15 | <p>It is the nature of metal detecting that it does not provide total coverage of the search transects. The combination of the detector sweep and the forward motion of the detectorist cause the search head to follow a zig-zag path across the transect leaving small areas unsearched.</p>   | 3.4.21                               | <p>field boundaries. Much weaker linear trends, scarcely perceptible in places, cross the field from north to south. There are a few zones of weak magnetic noise in the eastern half of the field, a large dipolar magnetic halo close to its south-western corner, and another dipolar halo midway along its northern boundary.</p>  |
| 3.4.16 | <p>The decision to undertake this survey with iron discrimination turned on will have prevented the detection of all but the most substantial of ferrous objects. The detection of non-ferrous objects will have been possible, assuming that they were of a reasonable size and not buried at excessive depth.</p>  | 3.4.22                               | <p>The magnetic background of Field 3 is variable, consisting of areas of subdued data interspersed with zones of small amorphous positive anomalies. There are also small zones of magnetic noise against the northern and southern field boundaries. A series of parallel linear anomalies stands out against this background, crossing the field from north to south.</p>   |
| 3.4.17 | <p><b>Assumptions</b></p> <p>There are no methodological assumptions applicable to the conduct of this fieldwork. Readers should be aware, however, that the interpretation of archaeological geophysical data is a qualitative process based on a combination of theoretical principles and past experience and that absolute confidence is not always achievable.</p>  | 3.4.23                               | <p>The magnetic background of Field 4 is highly variable, with complex patterns of amorphous positive and negative anomalies interrupted by broad trends. Overlying this background, there are a large number of positive linear anomalies. The most prominent is moderately intense (10–50 nanoTesla) and defines a 'D'-shaped feature, approximately 90m by 70m in extent with a small break in its eastern perimeter. To its north-east a set of narrower linear anomalies defines a rectangular feature measuring approximately 50m x 60m across. Further linear anomalies partially define a second rectangular feature and some smaller, more irregular features, which variously intersect with the D-shaped feature and the rectilinear one.</p> |
| 3.4.18 | <b>Results: description</b>  | 3.4.24                               | <p>Two positive linear anomalies define a right angle which partially encompasses the rectangular feature on its south-eastern side. A row of closely spaced discrete positive anomalies extends south-eastwards from the right angled corner, becoming progressively less distinct as it approaches the edge of the survey area. Other linear anomalies separate from the main group occur in the south-western and south-eastern corners of the field.</p>   |
| 3.4.19 | <b>Geophysical survey</b>  | 3.4.25                               | <p>A parallel set of positive linear anomalies crosses Field 4 from west to east. These anomalies are most distinct in the south-western corner of the field but may be traced intermittently elsewhere. A broad negative linear anomaly passes through the eastern part of the field parallel with a belt of saplings.</p>  |
| 3.4.20 | <p>Please refer to Figures CH004.15.31–32. The character of the magnetometer data varies considerably across the survey area. In the north and east, and especially in Field 4, there is complex and moderately intense magnetic background with an irregular pattern of overlying anomalies. To the south and west the data is much blander with simple patterns of anomalies and little background variation. A few small, high-intensity dipolar anomalies are scattered randomly across the entire area.</p>   | <b><i>Metal detecting survey</i></b> | <p><b>Results: interpretation</b></p> <p>No artefacts of archaeological or historic interest were found during the metal detecting survey. Consequently a second, more detailed, survey was not undertaken.</p>  |
| 3.4.21 | <p>The data from Field 1 is largely bland, except in the north-west, where there are extensive clusters of amorphous positive anomalies and associated negative halos. They vary in size but have fairly uniform intensities in the range 1 nanoTesla to 5 nanoTesla. To their south, there is a small zone of magnetic 'noise' containing several much more intense dipolar anomalies. A series of very weak and ill-defined parallel linear trends crosses the whole field from west to east, and there are two other very weak trends which are oriented from north-west to south-east.</p>   | 3.4.26                               | <p>The magnetometer survey has revealed a substantial archaeological site, of probable Iron Age date, located on the high ground in the north-eastern part of the survey area (Field 4). The positive linear anomalies in this area represent a complex of ditched enclosures and associated boundaries. Some of the enclosures intersect with each other, and this suggests that the site was a long-lived one which underwent several phases of development.</p>   |
| 3.4.22 | <p>The data from Field 2 is dominated by positive linear anomalies with typical intensities of around 5 nanoTesla and regular spacing's of 20m, which cross the field on north-west to south-east headings. Two similar anomalies lie parallel with the southern and north-western</p>   | 3.4.27                               | <p>The largest enclosure on the site is D-shaped, with a single east-facing entrance. The enclosure ditch appears to be a substantial one, around 2m wide, and has produced an exceptionally strong magnetic anomaly. The areas of greatest enhancement, in the southern entrance terminal and along the southern perimeter exceed 50 nanoTesla and such values suggest very strongly the presence of burnt soil or industrial residues within the ditch fill.</p>   |
| 3.4.23 |  | 3.4.28                               | <p>Several narrow positive linear anomalies occur within and around the D-shaped enclosure. Some appear to define a small irregular enclosure which intersects with the north-western</p>  |

corner of the D-shaped enclosure, and the others may represent elements of further enclosures which have not been completely detected.

3.4.29 To the north-east of the D-shaped enclosure is a slightly smaller enclosure, sub-rectangular in shape, which has possible entrance gaps to the south and north-east. At its south-western corner it intersects with part of another rectangular enclosure, the full extent of which is not clearly apparent.

3.4.30 To the south and east of the rectangular enclosures there are two linear ditches defining a right-angled boundary. A pit alignment extends south-eastwards from the corner of this feature heading in the general direction of another right-angled feature which may be part of another enclosure.

3.4.31 In the south-western corner of Field 4 there is a linear feature which may represent a ditch although it does not have an obvious relationship with the other archaeological remains in the field. To its east, along the southern edge of the field, there is a group of irregular positive anomalies which cannot be interpreted with a high degree of confidence. It is possible that they represent a cluster of pits (as shown on Figure CH004.15.33) but it would be equally possible for them to have a geological cause.

3.4.32 The closely-spaced parallel linear anomalies and trends which are apparent in all four fields represent the ploughed-out remnants of medieval ridge and furrow. Several different furlongs are represented and there is a clear tendency for the furrows to run with, rather than across, the grain of the land. The differing strength of the ridge and furrow anomalies correlates broadly with the nature of the underlying geology, showing that magnetic contrasts develop better in soils derived from ironstone than in those derived from Liassic strata.

3.4.33 The well-defined parallel linear anomalies in Field 2 evidently represent a modern network of field drains. The two dipolar halos in the same field relate to a parked vehicle and a mobile starting gate.

3.4.34 The zones of magnetic noise in Fields 1, 3 and 4 may be attributed to various forms of modern disturbance. That in Field 1 coincides with a spread of hardcore around a gateway, and that at the northern edge of Field 3 presumably indicates hardcore derived from the adjacent farm track. The other zones, in Fields 3 and 4, correlate with areas of dumped rubbish and stockpiled hardcore respectively.

3.4.35 The variable nature of the magnetic background correlates in broad terms with the mapped geology of the survey area. There are highly complex anomalies in the north-eastern area of the site, where the substrate is Northampton sand and ironstone, but a much more subdued background over the Liassic strata in the west. The areas of intermediate character, particularly in Field 3 and the north-eastern part of Field 1, may have a variety of causes. Some of the anomalies in these fields may relate to pockets of iron pyrites or other iron minerals within the mudstone, whilst others may represent unmapped patches of colluvium derived from the ironstone. The latter explanation seems particularly plausible for Field 1, where the distribution of the anomalies broadly follows the line of surface drainage.

3.4.36 The discrete positive anomalies at the north-western corner of Field 1 may relate to small areas of mineralisation or alluvial deposition caused by the springs which were observed in this area. The significance of the very weak linear trends in the same field is unknown, but they are perhaps of geological origin.

3.4.37 **Metal detecting survey**  
No artefacts of archaeological or historic interest were recovered during the metal detecting survey.

3.4.38 **Conclusions**  
The survey has confirmed the presence of an extensive archaeological site in the north-eastern part of the survey area, and has resolved details of its layout which had not been determined from the previously-available cropmark evidence. This site comprises a large, D-shaped enclosure, two intersecting rectilinear enclosures, a small irregularly-shaped enclosure, a boundary ditch and pit alignment, and other associated features. The date of the site is likely to be Iron Age, and it appears to have been occupied for an extended period, during which it underwent several phases of development.

3.4.39 Ridge and furrow, of medieval origin, has been detected across the majority of the survey area. The results are sufficient to show the general layout of the former open fields, although some of the detail is poorly resolved.

3.4.40 The metal detecting survey provided no useful archaeological or historical information, as no artefacts were recovered. Whilst this may partially reflect the limited extent of the survey area (only Field 1 and part of Field 2 were in a searchable condition) the requirement to search only for non-ferrous artefacts was also a significant restriction. On a medieval battlefield such as Edgecote, one of the most abundant and diagnostic classes of artefact is likely to be arrowheads, and these could not have been detected with the methodology employed.

## 3.5 Site CWoAA: Trafford Bridge (GLB144)

### Introduction

A geophysical survey was conducted over a predefined area at Trafford Bridge (national grid reference: SP 5180 4780; Figure CH004.15.34; GLB144). The aim of the survey was to locate and characterise any anomalies of possible archaeological interest within the site.

3.5.1 The site lies to the north of the Culworth–Edgecote road, approximately 10km north-east from the centre of Banbury. It is in Northamptonshire and straddles two parishes: Culworth, and Chipping Warden and Edgecote. The survey area encompassed eight fields/areas (Figure CH004.15.35) although it was not possible to survey Area 8 due to the presence of horses in the southernmost field. A total of approximately 11.2ha of land was surveyed. All of the surveyed fields were under short pasture and contained gentle slopes which caused no hindrance to the survey.

3.5.2 The site is situated on bedrock of the Dyrham Formation (siltstone and mudstone) and Marston Rock Formation (ferruginous limestone and ironstone), overlain by alluvial clays,

silts, sands and gravels<sup>49</sup>. The soils in the area are classified as slowly permeable, fine loamy and clayey soils of the Wickham 2 (711f) Association<sup>50</sup>.

## Methodology

3.5.4 The survey was in line with a written scheme of investigation<sup>51</sup>. All survey grid positioning was carried out using Trimble R8 Real Time Kinematic (RTK) VRSNow equipment. The geophysical survey area was georeferenced relative to the OS National Grid by tying in to local detail, and corrected to the mapping provided by the client. These tie-ins are presented in Figure CH004.15.46. Please refer to this diagram when re-establishing the grid.

3.5.5 The magnetometer survey was carried out with Bartington Grad 601-2 fluxgate gradiometers, collecting data every 0.25m along traverses 1m apart. Data processing was performed as appropriate using an in-house software package (GeoSuB), employing the following processing steps: zero mean sensor, step correction (de-stagger) and interpolation (on the Y axis). All survey work was carried out in accordance with current English Heritage guidelines<sup>52</sup>.

3.5.6 Data are presented as greyscale and XY trace plots (Figures CH004.15.39–45). The former allows simple feature identification and basic interpretation whilst the latter allows for analysis of the shape of the individual anomalies in order to better characterise the recorded responses.

## Limitations

3.5.7 Magnetic survey is an exceedingly effective technique for site evaluation. It provides fast data acquisition and responds, to some degree, to the majority of archaeological site-types. The technique relies upon the anthropogenic enhancement of naturally-occurring iron-bearing compounds in the soil. Detection rates can be poor where archaeological sites have seen only temporary and/or sporadic occupation, or where there is insufficient activity to drive the enhancement<sup>53</sup>. Success may also be limited over soils that are deficient in iron compounds, providing little material for enhancement. Conversely, the strength of response from soils and geological units which are naturally magnetic (e.g. igneous formations and soils derived thereof) may mask any subtler archaeological enhancements within.

3.5.8 The presence of ferrous structures either above or below ground (buildings, pylons, fences, pipes, etc.) will produce very strong magnetic fields extending far beyond their physical footprints. The strength of these magnetic 'shadows' may be such that they will mask practically any adjacent or underlying archaeological anomalies. Similarly, later features and demolition spreads or imported consolidation material can produce areas of magnetic disturbance that may mask underlying features.

3.5.9 As a general rule, the Bartington Grad601 instruments allow for a depth of investigation of approximately 1m, depending on the strength of the field produced by the buried feature. Below this depth, only particularly enhanced material will be detected with any kind of confidence.

3.5.10 The general conditions of the survey site were good, with the land consisting of short pasture on gentle slopes. Some young trees in Areas 1 and 2 were surrounded by wooden posts and wire mesh to protect them from livestock, and these have caused small gaps in the data.

## Assumptions

3.5.11 All of the fields contain small-scale ferrous-like anomalies, most clearly represented by sharp 'spikes' in the XY trace plots. These are typically assumed to be modern debris within the topsoil unless the site type or a priori knowledge suggests otherwise.

## Results: description

3.5.12 Please refer to Figures CH004.15.36–38. The magnetic results across the seven surveyed areas fall into several distinct categories. In the western part of Area 1 and the northern part of Area 2, the anomalies consist of amorphous zones of 'blurred' positive and negative responses. These zones were all detected in areas close to watercourses.

3.5.13 Large sections of Areas 2, 5 and 6 are dominated by very strong dipolar magnetic responses. These responses have resulted in a confused appearance to the greyscales, with anomalies having large magnetic 'halos' (appearing as white rings) that will have overpowered any less magnetically-strong anomalies in the vicinity.

3.5.14 Several areas contain long, linear, parallel positive magnetic anomalies, which vary in strength from area to area. Those in Area 5 are of a particularly strong magnetic nature, while those in the northern part of Area 7 are comparatively weak.

3.5.15 Area 7 contains a number of strongly magnetic linear, curvilinear, circular and isolated responses. These features continue into Area 6. Linear positive magnetic results can also be seen in the southern part of Area 2 and continuing into Area 3, although these features do not have the same strength or breadth of response as the features in Areas 6 and 7.

## Results: interpretation

3.5.16 Please refer to Figures CH-004-15.36–38. A number of responses have been identified as having an archaeological origin, the clearest of which lie in Areas 6 and 7. A large rectilinear positive magnetic anomaly [1] forms an enclosure, with an 'arm' leading off from the north-western corner of Area 6 into the central part of Area 7. Within enclosure [1], there are a number of smaller positive magnetic anomalies which may relate to small pits, hearths, ovens or small kilns, internal divisions and a possible round house [2].

3.5.17 In Area 7, a smaller 'D' shaped enclosure [3] can be seen abutting the southern side of enclosure [1]. Apart from a number of possible small pits, enclosure [3] has no obvious internal features reflected within the magnetic results.

3.5.18 South-east of enclosure [1] lies a third enclosure [4], which is approximately 30m square. There are hints of a possible internal ditch running parallel to the main enclosure ditch. A number of anomalies may represent internal features. These anomalies do not have a classic shape in either the XY Trace or greyscale, but this may be due to later plough damage.

3.5.19 In addition to feature [2], four circular responses [5, 6, 7 & 8] have been categorised as being of a probable archaeological origin. Two of these [7 & 8] lie adjacent to each other towards the south-eastern corner of Area 7. This pair of anomalies is characteristic of barrows, although this interpretation cannot be verified without further investigation. Anomalies [5] (south-

<sup>49</sup> British Geological Survey; GeoIndex; <http://mapapps2.bgs.ac.uk/geoindex/home.html>; Accessed: 23–25 July 2013.

<sup>50</sup> Soil Survey of England and Wales (1983), *Soils of England and Wales, Sheet 3: Midland and Western England*.

<sup>51</sup> Cotswold Archaeology (2013).

<sup>52</sup> English Heritage (2008).

<sup>53</sup> This is often true of lithic-era sites.

eastern corner of Area 6) and [6] (south-western corner of Area 7) are less characteristic of barrows; their true nature is not clear at the present data level.

3.5.20 The responses marked [9] (northern part of Area 6) are possibly archaeological in nature but their true nature is uncertain.

3.5.21 Parallel linear responses within Areas 4, 5, 6 and 7 are the result of ridge and furrow cultivation. There are two distinct groups: those in Areas 4 and 5 are much narrower and straighter, while those in Areas 6 and 7 have a wider spacing and distinct curves. Those in Areas 5 and 6 have a greater magnetic strength. This is most likely to be due to the plough cutting into magnetically-enhanced material and dragging it into the furrows.

3.5.22 In Area 1 linear positive magnetic responses [10] of probable archaeological origin may relate to the mill which formerly stood at the site. Anomalies in Area 5 [11] have also been interpreted as being of possible archaeological origin in part due to their similar alignment to the magnetically-enhanced ridge and furrow present within the area.

3.5.23 Anomaly [12] (Area 12) is a group of dipolar magnetic anomalies which would normally be demarcated as a zone of magnetic disturbance. Cartographic evidence, however, shows that this anomaly marks the old mill race and leats. It is likely that the strong magnetic response has been caused by the material used to fill the leats and level the ground. It is therefore difficult to say with certainty whether or not other areas of magnetic disturbance in areas without map evidence are archaeological in origin.

3.5.24 Natural anomalies predominate along the course of the River Cherwell, which demarcates the northern boundary of Areas 1 and 2. These anomalies are likely to show differing courses of the river meanders and changes within the soils which have been exposed to regular seasonal flooding. Natural anomalies are also in evidence on the western edge of Area 6, on the banks of a tributary to the River Cherwell.

3.5.25 Anomalies along the western edge of Area 6 are of uncertain origin, as although they are aligned alongside a water course in a similar manner to the natural anomalies discussed above they are somewhat more linear in nature than those in Areas 1 and 2. The Area 6 anomalies may be of natural origin; they may also, however, show the line of a former agricultural headland.

3.5.26 A large section of Area 6 has been demarcated as a zone of 'uncertain origin'. Although this zone contains many responses which may be archaeological in character, quarrying has rendered a detailed analysis of this area impossible, due to the difficulty in differentiating archaeological and quarrying activity. This quarrying is denoted on the 1st Edition OS and is visible as earthworks and 'pitting' on the ground surface).

3.5.27 Small discrete zones of magnetic disturbance have been detected throughout all of the survey areas. These relate largely to magnetic boundary fences, gates and water troughs. A strong magnetic response in Area 5 has been caused by the former farm entrance track [13] which is visible on the historic mapping of the area and is possibly associated with the uncertain anomalies to the south.

**Conclusions**

3.5.28 Two well-defined groups of archaeological anomalies have been detected within the survey at Trafford Bridge. The most prominent are within Areas 6 and 7, and consist of several enclosures along with pits, ditches and internal divisions. There are also several circular features (some better-defined than others) that could indicate barrows or roundhouses, perhaps pre-dating the enclosures in these areas. In much of Area 6 quarrying and ploughing has hindered a fuller interpretation.

3.5.29 Around Culworth Mill the survey has detected watercourses associated with the functioning of the mill, as well as the original entrance road.

3.5.30 Evidence for medieval ridge and furrow cultivation was recorded in Areas 4–7.

3.5.31 Natural anomalies apparently associated with former courses of the River Cherwell were also detected.

## 3.6 References

Bartington, G. and Chapman, C. (2003), A high-stability fluxgate magnetic gradiometer for shallow geophysical survey applications, *Archaeological Prospection*, Vol. 11.

British Geological Survey ; GeoIndex; <http://mapapps2.bgs.ac.uk/geoindex/home.html>; Accessed: 23–25 July 2013.

British Geological Survey; Geology of Britain Viewer; <http://mapapps.bgs.ac.uk/geologyofbritain/home.html>; Accessed: 10 July 2013.

Clements, P. (2007), Archaeological geophysical survey: Thorpe Mandeville to Greatworth pipeline, Northamptonshire, *Northamptonshire Archaeology report*, No. 07/200.

Cotswold Archaeology (2013), *HS2 Northamptonshire: Written Scheme of Investigation for Geophysical and Metal Detecting Surveys*.

English Heritage (2008), *Geophysical Survey in Archaeological Field Evaluation*.

Soil Survey of England and Wales (1983), *Soils of England and Wales, Sheet 3: Midland and Western England*.

## 3.7 Figures

|              |   |          |
|--------------|---|----------|
| CH-004-15.13 | OUoAB: Site Location Diagram                      | 1:50000  |
| CH-004-15.14 | OUoAB: Location of Survey Area                    | 1:5000   |
| CH-004-15.15 | OUoAB: Magnetometer Survey - Greyscale Plot       | 1:1000   |
| CH-004-15.16 | OUoAB: Magnetometer Survey - Interpretation       | 1:1000   |
| CH-004-15.17 | OUoAB: Magnetic Data: XY Trace and Greyscale Plot | 1:1000   |
| CH-004-15.18 | OUoAB: Tie-In Information                         | 1: 1250  |
| CH-004-15.19 | OUoAC: Site location diagram                      | 1:50,000 |
| CH-004-15.20 | OUoAC: Location of survey area                    | 1:15,000 |
| CH-004-15.21 | OUoAC: Tie-in information                         | 1:2,500  |
| CH-004-15.22 | OUoAC: Magnetometer data plot                     | 1:2,500  |
| CH-004-15.23 | OUoAC: Interpretation plot                        | 1:2,500  |
| CH-004-15.24 | CHOAC: Site location diagram                      | 1:50,000 |

|              |   |          |
|--------------|---|----------|
| CH-004-15.25 | CHoAC: Location of survey area                                | 1:10,000 |
| CH-004-15.26 | CHoAC: Tie-in information                                     | 1:2,500  |
| CH-004-15.27 | CHoAC: Magnetometer data plot                                 | 1:2,500  |
| CH-004-15.28 | CHoAC: Interpretation plot                                    | 1:2,500  |
| CH-004-15.29 | CHoAB: Site location diagram                                  | 1:50,000 |
| CH-004-15.30 | CHoAB: Location of survey area                                | 1:15,000 |
| CH-004-15.31 | CHoAB: Tie-in information                                     | 1:2,500  |
| CH-004-15.32 | CHoAB: Magnetometer data plot                                 | 1:2,500  |
| CH-004-15.33 | CHoAB: Interpretation plot                                    | 1:2,500  |
| CH-004-15.34 | CWoAA: Site Location Diagram                                  | 1:50000  |
| CH-004-15.35 | CWoAA: Location of Survey Area                                | 1:5000   |
| CH-004-15.36 | CWoAA: Magnetometer Survey - Greyscale Plot                   | 1:2500   |
| CH-004-15.37 | CWoAA: Magnetometer Survey - Greyscale Plot                   | 1:2500   |
| CH-004-15.38 | CWoAA: Magnetometer Survey - Interpretation                   | 1:2500   |
| CH-004-15.39 | CWoAA: Magnetic Data - Area 1: XY Trace Plot & Greyscale Plot | 1:1000   |
| CH-004-15.40 | CWoAA: Magnetic Data - Area 2: XY Trace Plot & Greyscale Plot | 1:1000   |
| CH-004-15.41 | CWoAA: Magnetic Data - Area 3: XY Trace Plot & Greyscale Plot | 1:1000   |
| CH-004-15.42 | CWoAA: Magnetic Data - Area 4: XY Trace Plot & Greyscale Plot | 1:1000   |
| CH-004-15.43 | CWoAA: Magnetic Data - Area 5: XY Trace Plot & Greyscale Plot | 1:1000   |
| CH-004-15.44 | CWoAA: Magnetic Data - Area 6: XY Trace Plot & Greyscale Plot | 1:1000   |
| CH-004-15.45 | CWoAA: Magnetic Data - Area 7: XY Trace Plot & Greyscale Plot | 1:1000   |
| CH-004-15.46 | CWoAA: Tie-In Information                                     | 1:2500   |

## 4

## Fieldwalking surveys

### Site OUoAB: Greatworth Hall (GLB213)

#### Introduction

On 20–23 March 2013 an archaeological fieldwalking survey was carried out at a site west of Greatworth Park, Northamptonshire (centred on national grid reference: SP 5597 4305; Figure CH004.15.47; GLB213). The objective of the survey was to provide further information on the archaeological potential of the survey site.

#### The site

The survey site lies in agricultural land some 0.5km north-east of central Greatworth and approximately 50m west of Greatworth Hall (Figure CH004.15.47).

The site encloses approximately 22ha. At the time of the survey it comprised a series of agricultural fields with boundaries marked by hedgerines and modern fencing.

Field 1 displayed a gentle rise to the north, as well as some undulations, particularly to the south-west and south-east. Fields 2 and 3 were fairly flat within their northern halves but dipped into a pronounced valley running north-west/south-east through the middle of the fields before rising again to the south. These fields also displayed localised undulations.

The site's bedrock geology is recorded as sandstones, limestones and ironstones of the Taynton Limestone Formation, Horsehay Sand Formation and Northampton Sand Formation. These sedimentary bedrocks were formed in the Jurassic Period (145–200 million years ago), in shallow seas<sup>54</sup>.

Where recorded, the site's superficial deposits comprise Mid Pleistocene Till. These deposits formed up to two million years ago in the Quaternary Period in Ice Age conditions<sup>55</sup>.

#### Summary historic/archaeological background

The following information is summarised from the records of the Northamptonshire County HER.

A geophysical survey undertaken as part of the Thorpe Mandeville to Greatworth Pipeline Project recorded a curving ditch to the immediate north-east of the site. This ditch was cut by medieval furrows and was considered to be of possible prehistoric date. A group of residual prehistoric worked flints was recovered from later furrows in this area during subsequent archaeological fieldwork.

A possible Iron Age/Roman settlement has been recorded to the east of the site. Pottery scatters suggest a further Roman settlement to the immediate north-east of the site.

The southern end of the site lies within the probable boundary of a former medieval deer park at Halse although the exact location of this park is unknown.

<sup>54</sup> British Geological Survey; Geology of Britain Viewer; [http://maps.bgs.ac.uk/geology\\_viewer\\_google/googleviewer.html](http://maps.bgs.ac.uk/geology_viewer_google/googleviewer.html); Accessed: 28 February 2013.

<sup>55</sup> British Geological Survey; Geology of Britain Viewer; [http://maps.bgs.ac.uk/geology\\_viewer\\_google/googleviewer.html](http://maps.bgs.ac.uk/geology_viewer_google/googleviewer.html); Accessed: 28 February 2013.

4.1.11 The remains of medieval ridge and furrow have been recorded to the north-east and south-west of the site.

4.1.12 The southern part of the site lies within the grounds of Greatworth Hall. This Grade II listed farmhouse was constructed in the early 18th century.

**Methodology**

4.1.13 The fieldwalking survey was carried out in accordance with a written scheme of investigation<sup>56</sup>. It was also in line with guidance issued by the Institute for Archaeologists<sup>57</sup> and English Heritage<sup>58</sup>.

4.1.14 The fields within the survey site were numbered 1–3 (Figure CH004.15.48). A series of transects spaced at 20m intervals was established within the individual fields, using a Leica Smart Rover GPS. Transects were tied in to the OS grid and assigned alphabetic identifiers. Field 1 contained 16 transects (A–P); Field 2 contained 10 transects (A–J); Field 3 contained eight transects (A–H).

4.1.15 The fieldwalking team walked the length of the transects. A 2m-wide corridor centred on each individual transect was observed as a basis for artefact collection.

4.1.16 The length of each transect was subdivided into a series of 20m stints. Artefacts recovered from each individual stint were bagged together.

4.1.17 There was provision for artefacts considered by the survey team to be of special archaeological interest to be located individually using a Leica Smart Rover GPS. No such artefacts were recovered, however.

4.1.18 There was also provision for detailed fieldwalking at a greater resolution in areas where find concentrations were noted. It was decided in the field, however, that there was no need for such intensification of survey.

4.1.19 All artefacts were collected, with the exception of any materials positively identified as modern. Any large concentrations of certain materials such as stone, slag and tile were sampled only.

**Limitations**

4.1.20 The effectiveness of fieldwalking surveys can be dependent on a number of factors, including land use, topography and weather conditions. Surveys are generally most effective on land which has been ploughed and where the ground surface is clearly visible, as these ground conditions facilitate movement of artefacts to the surface and aid subsequent artefact identification and retrieval.

4.1.21 The site was in agricultural use. It had been ploughed, but not recently. Although it was under crop stubble, the soil surface was generally visible and survey conditions were considered to be good.

## Assumptions

4.1.22 There is a general assumption that surface concentrations of artefactual material overlie and originate from below-ground archaeological remains. It should be noted, however, that processes such as manuring and ploughing can spread artefacts over a wide area and as such, surface artefacts may not always denote the presence of archaeological sites. Nevertheless, it is considered that the greater the concentration of artefacts, the less likely it is to have been redeposited by such processes.

4.1.23 It is often assumed that the higher the quantity of recovered artefacts, the more extensive the corresponding below-ground archaeological remains. The converse of this is that if no (or only very limited) artefacts are recovered, then it is assumed that there are no below-ground archaeological remains at the survey site. It should be noted, however, that different types of archaeological sites produce different quantities of artefactual material: for example, a medieval site may be associated with considerably more artefacts than an early prehistoric site, and a settlement site may produce more material than a ritual site which saw activity only during festivals. The limitations of fieldwalking surveys (see 'Limitations,' Section 4.1.20 of this report) should also be borne in mind: the amount of artefacts recovered can be dependent upon a number of environmental and land-use factors.

## Results: description

4.1.24 The following provides a brief description of each of the main periods/categories of recovered artefacts. A detailed report on the finds begins in Section 4.1.32. The artefact distributions are depicted on Figures CH004.15.48–49.

**Prehistoric (pre-AD 43): worked flint (Figure CH004.15.48)**

4.1.25 Forty-five pieces of worked flint were recovered. These include one probable bladelet, one core and two core fragments, as well as numerous flakes and a possible unfinished knife.

4.1.26 These items are generally undateable, although one core fragment dates to the Mesolithic or Early Neolithic (circa 10,000– circa 3,000 BC), the other core fragment dates to the Neolithic (circa 4,000– circa 2,400 BC), and the complete core is probably Bronze Age (circa 2,400– circa 700 BC) in date.

4.1.27 There are indications that the initial stages of flint knapping took place elsewhere, with the material being brought to the site for further working once much of the outer cortical surface had been removed.

4.1.28 Worked flint was recovered from all three fields, but concentrations were visible in the south-eastern corner of Field 1, the south-western end of Field 3 (in a line running north-north-west/south-south-east) and to the north-east of centre in Field 3.

**Medieval (AD 1066–1539): pottery (Figure CH004.15.49)**

4.1.29 Thirteen sherds of medieval pottery were recovered. This material displayed a pronounced tendency towards the north-western corner of the site.

<sup>56</sup> Cotswold Archaeology (2013). HS2 Northamptonshire: Written Scheme of Investigation for an Archaeological Fieldwalking Survey.

<sup>57</sup> Institute for Archaeologists (2008), Standard and Guidance for Archaeological Field Evaluation.

<sup>58</sup> English Heritage (1991), Management of Archaeological Projects 2, English Heritage. (2006). Management of Research Projects in the Historic Environment (MoRPHE): Project Manager's Guide.

|        |  |   |
|--------|--|---|
|        | <i>Post-medieval/modern (AD 1540–present): pottery and ceramic building material (Figure CH004.15.49)</i>  |   |
| 4.1.30 | A total of 129 sherds of post-medieval/modern pottery was retrieved, the majority of which dates post-circa 1750. This material displayed a marked cluster towards the southern boundary of Field 3, perhaps resulting from a localised dump of rubbish.   | 4.1.40 The possible unfinished knife is a circular object with only a very small amount of cortex remaining. It has been worked in a discoidal manner, i.e. with flakes being removed from all directions and on both faces. There appears to be a particular concentration of retouch on both faces along the edge opposite to the area of cortex, thinning the edge in this area.   |
| 4.1.31 | A small amount (173g) of post-medieval ceramic building material was recovered, mainly comprising flat tile and brick fragments.   | 4.1.41 The unclassifiable tool has one mostly cortical face with several small flake removals around the edge and one steep edge. The other face may originally have been the ventral surface of a flake but is obscured by small flake removals from around the edge. This item does not conform to any standard tool types and may represent an ad hoc or unfinished tool.  |
|        | <b>The finds</b>   |   |
| 4.1.32 | The following is a detailed report on the artefactual material recovered from the site during the fieldwalking survey.   | 4.1.42 The collection does not include any tool types which typically belong to any particular period, although the technology displayed on the flakes and cores is suggestive of activity spanning most of the prehistoric period.   |
| 4.1.33 | Surface-collected finds were recorded directly to an Ms Access database with position (Field/Transect/stint) plotted using ARCVIEW GIS software. All pottery was quantified by sherd count and weight according to period, and a note was made of fabrics or vessel forms where discernible. Prehistoric worked flint was quantified by count and class (flakes/cores/tools) and ceramic building material was recorded by period group and weight.  |   |
|        | <i>Prehistoric worked flint</i>  | <i>Prehistoric worked flint: distribution</i>   |
| 4.1.34 | A total of 45 pieces of worked flint was recovered. The unpatinated raw material mostly consists of good quality dark grey flint (although flaws were visible on a number of items), with a few pieces on pale grey and one honey-coloured piece of flint. Twenty-six per cent of the items are broken, which is unsurprising in a surface-collected assemblage.   | 4.1.43 Worked flint was recovered from all three fields, but the majority was from Fields 1 and 3. There was a concentration of flints in the south-eastern corner of Field 1, which included three of the tools. Field 3 displayed two concentrations of lithics: one at the south-western end (which followed a line running north-north-west/south-south-east) and one just north-east of the centre of the field. The latter concentration included one tool and one core.  |
| 4.1.35 | The flints which resulted from primary flint knapping technology were 38 flakes, one probable bladelet (the butt end is missing), one core and two core fragments. It is not generally possible to date individual flakes. Two (5%) of the flakes show evidence of preparation of the striking platform of the cores from which they were struck, a feature which is typically seen during the Mesolithic and Early Neolithic.   | 4.1.44 The collected flints suggest activity focused in the south-eastern area of Field 1, and the south-western end and middle to north-eastern end of Field 3, probably throughout the prehistoric period (Mesolithic, Neolithic and Bronze Age).   |
| 4.1.36 | One core fragment was very small and had been used to produce flakes from at least two platforms. It was typical of those knapped during the Neolithic period. The other core fragment was also very small, and both flakes and blades (or bladelets) had been removed from two opposing platforms. The removal of blades or bladelets (blades 12mm or less in width) dates this item to the Mesolithic or Early Neolithic. The core had evidence of flake removals from multiple platforms. The irregularity of this core suggests it may be a Bronze Age item. |   |
| 4.1.37 | The reworked flints consisted of four items: two retouched flakes, one bifacially worked item which may be an unfinished knife and one unclassifiable item.  | <i>Medieval pottery</i>   |
| 4.1.38 | One retouched flake featured fine, invasive retouch which was limited to the proximal end of the left ventral edge. A function cannot be easily ascribed to this tool as the retouch is of the type usually seen on a knife and not a scraper, but the retouch would normally be much more extensive to produce a thin tool with a sharp cutting edge. It is possible that this item is either unfinished or a practice piece.   | 4.1.45 A total of 13 sherds of medieval pottery (120g) was recorded from 12 grid locations. All sherds exhibit moderate to high levels of abrasion, consistent with extended exposure within the plough zone. Recorded pottery types are mainly unglazed sandy coarsewares attributable to a broadly medieval date. Two sherds in a glazed jug fabric of uncertain type, two in a limestone-tempered unglazed coarseware (possibly Northants fabric CTS 209) and one in a shell-tempered coarseware (Northants fabric CTS 330) were also recorded. The limestone-tempered sherds probably belong to the Cotswolds oolitic limestone tradition and are unlikely to date much beyond c. 1300. Dating spanning the 12th to mid-14th centuries is probable for the shelly fabric. |
| 4.1.39 | The other retouched flake has been retouched along part of the left edge of the dorsal face and its function is also unclear.  | 4.1.46 The medieval pottery group is relatively small and is unlikely to be indicative of intensive activity. In its distribution there is a quite marked tendency to the north-eastern portion of the survey area, with nine sherds recovered from the northern half of Field 3.   |
|        | <i>Post-medieval and modern pottery</i>  |   |
|        |  | 4.1.47 A total of 129 sherds of post-medieval and modern pottery (744g) was recorded, coming from 50 grid locations. The group includes a sherd of Midlands Purple ware, a type known to span the late medieval and earlier post-medieval periods, c. 1400–1700. The large majority comprises modern types dating after c. 1750 and includes refined whitewares, Mocha type wares and porcelain. Smaller quantities of internally-glazed earthenwares are broadly dateable across the late 16th to the 18th or earlier 19th centuries.  |
|        |  | 4.1.48 The distribution for this category of material shows clustering towards the southern end of Field 3, with 74 sherds coming from the 0m–20m stints in this field. Almost all of the material  |

|  |  |
|--|--|
| from this area consists of modern pottery and may have resulted from dumping or rubbish discard, probably in the 19th century.   | CH004.15.40). The objective of the survey was to provide further information on the archaeological potential of the survey site.   |
| <b>Post-medieval ceramic building material</b>   | <b>The site</b>  |
| 4.1.49 A small group (173g) of post medieval ceramic building material was recorded, coming from seven stints. With the exception of a salt-glazed stoneware drain fragment (F2/B/280), the group comprises flat tile and brick fragments. This material is sparsely distributed across the survey area with no apparent clustering.   | 4.2.2 The survey site lies in agricultural land some 0.92km north of Greatworth. It is approximately 0.38km south-south-east of Dean Barn, on the northern side of the B4525 Helmdon Road (Figure CH004.15.40).                                      |
| <b>Results: interpretation</b>   | 4.2.3 The site encloses approximately 9.8ha. At the time of the survey, it comprised a series of agricultural fields, with boundaries marked by hedgerows.   |
| 4.1.50 The worked flints recovered during the survey suggest activity focused in the south-eastern area of Field 1 and the south-western and north-eastern regions of Field 3. This activity probably took place throughout the Mesolithic, Neolithic and Bronze Age eras (circa 10,000–700 BC). The linear concentration of worked flints in the south-western end of Field 3 may suggest the presence of a prehistoric ditch at the site. These tallies with other evidence for prehistoric activity in the area, such as the possible prehistoric ditch recorded to the north-east of the site (see Section 4.1.7). | 4.2.4 The site was generally flattish, dipping to the north. Field 2 displayed a shallow valley running north/south through its centre.  |
| 4.1.51 The survey recorded no evidence for Iron Age or Roman activity at the site.   | 4.2.5 The site's bedrock geology is recorded as Horsehay Sand Formation sandstone. This sedimentary bedrock formed approximately 164–176 million years ago in the Jurassic Period, in shallow seas <sup>59</sup> .                                   |
| 4.1.52 The relatively small amount of medieval pottery recovered during the survey is unlikely to be indicative of intensive activity.   | 4.2.6 The site's superficial deposits are recorded as Mid Pleistocene Till. These deposits formed up to two million years ago in the Quaternary Period, in Ice Age conditions <sup>60</sup> .  |
| 4.1.53 The relatively small amounts of post-medieval/modern pottery may have originated from dumping of material in order to improve drainage and/or traction. The cluster of post-medieval/modern material towards the southern boundary of Field 3 probably resulted from a localised dump of rubbish.   | <b>Summary historic/archaeological background</b>  |
| <b>Conclusions</b>   | 4.2.7 The following information is summarised from the records of the Northamptonshire County HER.   |
| 4.1.54 Worked flints recovered during the survey indicate Mesolithic, Neolithic and Bronze Age activity focused in the south-eastern area of Field 1 and the south-western and north-eastern regions of Field 3. The nature of this activity is unknown, but any associated below-ground archaeological remains may have the potential to provide data on the pre-Roman development and exploitation of the area.  | 4.2.8 The site is within an area with high potential for prehistoric, Roman and early medieval remains.  |
| 4.1.55 The survey recorded no evidence for Iron Age or Roman activity at the site, suggesting that the possible settlements of this date recorded to the east and north-east of the site did not extend as far as the survey area.   | 4.2.9 An undated ditch aligned north-west/south-east was recorded at the south-eastern corner of the site during archaeological fieldwork associated with the Thorpe Mandeville to Greatworth pipeline.  |
| 4.1.56 The relatively small amount of medieval pottery recovered during the survey is consistent with the site having lain within a medieval deer park, or at the edge of agricultural land.   | 4.2.10 The RAF Greatworth Wireless Transmission Station lay to the immediate south of the site. This station was set up in the 1940s and closed in the 1980s; the station site is now occupied by the Greatworth Park industrial/commercial complex. |

## 4.2 Site OUoAC: Greatworth

### Introduction

4.2.1 On 28 March 2013 an archaeological fieldwalking survey was carried out at a site between Dean Barn and Greatworth Park, Northamptonshire (centred on SP 5515 4373; Figure

<sup>59</sup> British Geological Survey; Geology of Britain Viewer; [http://maps.bgs.ac.uk/geology\\_viewer\\_google/googleviewer.html](http://maps.bgs.ac.uk/geology_viewer_google/googleviewer.html); Accessed: 28 February 2013.

<sup>60</sup> Ibid.

<sup>61</sup> Cotswold Archaeology (2013).

<sup>62</sup> Institute for Archaeologists (2008).

<sup>63</sup> English Heritage (1991).

4.2.13 The fieldwalking team walked the length of the transects. A 2m-wide corridor centred on each individual transect was observed as a basis for artefact collection.

4.2.14 The length of each transect was subdivided into a series of 20m stints. Artefacts recovered from each individual stint were bagged together.

4.2.15 There was provision for artefacts considered by the survey team to be of special archaeological interest to be located individually using a Leica Smart Rover GPS. No such artefacts were recovered, however.

4.2.16 There was also provision for detailed fieldwalking at a greater resolution in areas where find concentrations were noted. It was decided in the field, however, that there was no need for such intensification of survey.

4.2.17 All artefacts were collected, with the exception of any materials positively identified as modern. Any large concentrations of certain materials such as stone, slag and tile were sampled only.

**Limitations**

4.2.18 The effectiveness of fieldwalking surveys can be dependent on a number of factors, including land use, topography and weather conditions. Surveys are generally most effective on land which has been ploughed and where the ground surface is clearly visible, as these ground conditions facilitate movement of artefacts to the surface and aid subsequent artefact identification and retrieval.

4.2.19 The site was in agricultural use and had been freshly ploughed, creating ideal survey conditions. On the day of the survey, however, there was snow coverage (around 25% of the ground surface), which will have had a negative impact on artefact identification. Additionally, due to access constraints, stints within the survey site were established at 40m intervals, rather than the 20m intervals specified in the written scheme of investigation<sup>64</sup>.

4.2.20 While both of these factors are likely to have had a negative impact on finds retrieval, it was still considered that if significant quantities of artefacts were present at the site, a sample of this material would be identified and retrieved.

**Assumptions**

4.2.21 There is a general assumption that surface concentrations of artefactual material overlie and originate from below-ground archaeological remains. It should be noted, however, that processes such as manuring and ploughing can spread artefacts over a wide area and as such, surface artefacts may not always denote the presence of archaeological sites. Nevertheless, it is considered that the greater the concentration of artefacts, the less likely it is to have been redeposited by such processes.

4.2.22 It is often assumed that the higher the quantity of recovered artefacts, the more extensive the corresponding below-ground archaeological remains. The converse of this is that if no (or only very limited) artefacts are recovered then it is assumed that there are no below-ground archaeological remains at the survey site. It should be noted, however, that different types of archaeological sites produce different quantities of artefactual material: for example, a

medieval site may be associated with considerably more artefacts than an early prehistoric site, and a settlement site may produce more material than a ritual site which saw activity only during festivals. The limitations of fieldwalking surveys (see 'Limitations,' Section 4.2.18 of this report) should also be borne in mind: the amount of artefacts recovered can be dependent upon a number of environmental and land-use factors.

### Results: description

4.2.23 The following provides a brief description of each of the main periods/categories of recovered artefacts. A detailed report on the finds begins in Section 4.2.26 of this report. The artefact distributions are depicted on Figure CH004.15.51.

**Medieval (AD 1066–1539): pottery**

4.2.24 Three sherds of medieval pottery dating from the 12th to 14th centuries were recovered from Field 2.

**Post-medieval (AD 1540–1800): pottery and ceramic building material**

4.2.25 Twelve sherds of post-medieval/modern pottery were retrieved. A small quantity (231g) of post-medieval ceramic building material was also recovered, comprising flat roof tile fragments and some undiagnostic brick or tile. The post-medieval/modern material displayed a fairly general spread throughout the site.

**The finds**

4.2.26 The following is a detailed report on the artefactual material recovered from the site during the fieldwalking survey.

4.2.27 Surface-collected finds were recorded directly to an Ms Access database with grid location (Field/Transect/stint) plotted using ARCview GIS software. All pottery was quantified by sherd count and weight according to period, and a note was made of fabrics or vessel forms where discernible.

4.2.28 Quantities of all artefact category were small and the plotted spatial distribution demonstrates no obvious tendencies. The finds have been discussed in summary according to category and period as appropriate.

**Medieval pottery**

4.2.29 A total of three sherds (34g) of medieval pottery was recorded from three stints. All three sherds consist of unglazed sandy coarsewares which are expected to date across the 12th to 14th centuries. A rim sherd from F2/D/o is from a jar with an everted/thickened rim. A sherd from F2/G/140 features grooved decoration.

**Post-medieval/modern pottery**

4.2.30 Pottery of post-medieval or later date was recorded from 11 stints and amounted to 12 sherds (106g). Most material comprises (internally) black or clear-glazed earthenwares. Unglazed earthenwares (flowerpot) and refined whiteware types are present as single sherds. The glazed earthenware types probably date to the 17th or 18th centuries; the remainder probably to the later 18th or 19th centuries.

<sup>64</sup> Cotswold Archaeology (2013).

|        |   |  |
|--------|---|--|
| 4.2.31 | <p><i>Post-medieval ceramic building material</i></p> <p>Small quantities of ceramic building material (231g) were recorded from eight locations. The group includes flat roof tile fragments and some undiagnostic brick or tile.</p>  | <p>4.3.5</p> <p>The site's bedrock geology is recorded as Northampton Sand Formation sandstone and Whitby Mudstone Formation. These sedimentary bedrocks formed in the Jurassic Period (145–200 million years ago), in shallow seas. The site's superficial deposits are not recorded<sup>66</sup>.</p>  |
| 4.2.32 | <p><b>Results: interpretation</b></p> <p>Only small quantities of medieval and post-medieval artefactual material were recovered by the survey, and there were no obvious trends visible in the artefact distribution. This result suggests that the site has not seen intensive pre-modern activity.</p>   | <p>4.3.6</p> <p>The site is within the western edge of a possible prehistoric settlement visible as a series of cropmarks defining enclosures and ditches.</p>   |
| 4.2.33 | <p>There was snow coverage on the day of the survey, and access constraints meant that survey stints were established at 40m intervals rather than the 20m intervals specified in the written scheme of investigation<sup>65</sup>. While both of these factors are likely to have had a negative impact on finds retrieval, it was still considered that if significant quantities of artefacts had been present at the site, a sample of this material would have been identified and retrieved. As such, the almost total dearth of artefacts pre-dating the post-medieval period is considered likely to be an accurate reflection of the material present at the site.</p>   | <p>4.3.7</p> <p>The site is also in the vicinity of the Edgcote Moor battlefield (aka Danesmoor). This battle took place in AD 1469 and was part of the Wars of the Roses. The battlefield is not securely located.</p>  |
| 4.2.34 | <p><b>Conclusions</b></p> <p>Despite the archaeological potential of the survey area (see Section 4.2.7F), the fieldwalking survey recorded no evidence for historic/archaeological activity at the site.</p>   | <p><b>Methodology</b></p> <p>The fieldwalking survey was carried out in accordance with a written scheme of investigation<sup>67</sup>. It was also in line with guidance issued by the Institute for Archaeologists<sup>68</sup> and English Heritage.<sup>69</sup></p>   |
| 4.3    | <p><b>Site CHoAB: Culworth Grounds (GLB105)</b></p> <p><b>Introduction</b></p> <p>On 15–19 March 2013 an archaeological fieldwalking survey was carried out at a site west of Culworth Grounds Farm, Northamptonshire (centred on national grid reference: SP 5292 4626; Figure CH004.15.52; GLB105). The objective of the survey was to provide further information on the archaeological potential of the survey site.</p> <p><b>The site</b></p> <p>The survey site lies in agricultural land some 0.6km north-west of Lower Thorpe Mandeville, and approximately 0.35km west of the main Culworth Grounds Farm complex (Figure CH004.15.52).</p> <p>The site encloses approximately 23.5ha. At the time of the survey, it comprised a series of agricultural fields, with boundaries marked by hedgerows. A trackway ran through the centre of the survey area.</p> <p>Field 1 was at the summit of a small hill, and rose up gently towards its centre and its western boundary. Field 2 was on lower-lying ground at the base of the hill. This field featured a general slope up to its south-eastern corner, which became very pronounced as the corner was approached and the hill increased in steepness. Field 3 was on the western flank of the hill and displayed a pronounced slope up to the north-eastern field boundary. There was also a slight dip within the central part of this north-eastern field boundary. The western half of Field 3 displayed a gentle slope down to the north.</p> | <p>4.3.8</p> <p>The fields within the survey site were numbered 1–3 (Figure CH004.15.53). A series of transects was established within the individual fields, using a Leica Smart Rover GPS. Transects were tied in to the OS grid and assigned alphabetic identifiers. Field 1 contained 13 transects (A–M) spaced at 20m intervals; Field 2 contained sixteen transects (A–P), spaced at 20m intervals; Field 3 contained six transects (A–F), spaced at 40m intervals.</p> <p>4.3.9</p> <p>The fieldwalking team walked the length of the transects. A 2m-wide corridor centred on each individual transect was observed as a basis for artefact collection.</p> <p>4.3.10</p> <p>The length of each transect was subdivided into a series of 20m stints. Artefacts recovered from each individual stint were bagged together.</p> <p>4.3.11</p> <p>There was provision for artefacts considered by the survey team to be of special archaeological interest to be located individually using a Leica Smart Rover GPS. No such artefacts, however, were recovered.</p> <p>4.3.12</p> <p>There was also provision for detailed fieldwalking at a greater resolution in areas where find concentrations were noted. It was decided in the field, however, that there was no need for such intensification of survey.</p> <p>4.3.13</p> <p>All artefacts were collected, with the exception of any materials positively identified as modern. Any large concentrations of certain materials such as stone, slag and tile were sampled only.</p> <p><b>Limitations</b></p> <p>The effectiveness of fieldwalking surveys can be dependent on a number of factors, including land use, topography and weather conditions. Surveys are generally most effective on land which has been ploughed and where the ground surface is clearly visible, as these ground</p> |

<sup>66</sup> British Geological Survey, 'Geology of Britain Viewer' [http://maps.bgs.ac.uk/geology\\_viewer\\_google/googleviewer.html](http://maps.bgs.ac.uk/geology_viewer_google/googleviewer.html); Accessed: 28 February 2013.

<sup>67</sup> Cotswold Archaeology (2013).

<sup>68</sup> Institute for Archaeologists (2008).

<sup>69</sup> English Heritage (1991).

|        |   |        |  |
|--------|---|--------|--|
|        | conditions facilitate movement of artefacts to the surface and aid subsequent artefact identification and retrieval.  |        |  |
| 4.3.16 | Field 2 was under crop stubble and had patchy grass cover. The soil surface was generally visible, however, and the field's survey suitability was considered good.   | 4.3.22 | • three scrapers, including one thumbnail type: in use throughout the prehistoric period, although the thumbnail scraper dates to the Late Neolithic/Early Bronze Age.).   |
| 4.3.17 | Field 3 was also under crop stubble but had relatively extensive grass cover, with the soil surface visible in patches only. As such, Field 3 was considered to be of limited survey suitability. Additionally, access constraints meant that the stints within Field 3 were established at 40m intervals, rather than the 20m intervals specified in the written scheme of investigation <sup>70</sup> . The ground conditions and 40m stints in Field 3 are likely to have impaired finds retrieval in this field.  | 4.3.23 | There are also numerous worked flints which cannot be closely dated, including core fragments, choppers and flakes, some of which have been retouched.   |
|        |   | 4.3.24 | Worked flints were recovered from all three fields, but the majority came from Field 1, with the highest concentrations of flints lying within the northern and eastern parts of this field.   |
|        |   |        | <i>Medieval (AD 1066–1539): pottery (CH004.15.54)</i>  |
| 4.3.18 | There is a general assumption that surface concentrations of artefactual material overlie and originate from below-ground archaeological remains. It should be noted, however, that processes such as manuring and ploughing can spread artefacts over a wide area and as such, surface artefacts may not always denote the presence of archaeological sites. Nevertheless, it is considered that the greater the concentration of artefacts, the less likely it is to have been redeposited by such processes.   | 4.3.25 | Eight sherds of medieval pottery were recovered. Where dateable, these originated circa 1250–1500. Although the quantity of medieval pottery is small, it displayed a general tendency towards the western half of Field 2.  |
| 4.3.19 | It is often assumed that the higher the quantity of recovered artefacts, the more extensive the corresponding below-ground archaeological remains. The converse of this is that if no (or only very limited) artefacts are recovered, then it is assumed that there are no below-ground archaeological remains at the survey site. It should be noted, however, that different types of archaeological sites produce different quantities of artefactual material: for example, a medieval site may be associated with considerably more artefacts than an early prehistoric site, and a settlement site may produce more material than a ritual site which saw activity only during festivals. The limitations of fieldwalking surveys (see Section 4.3.15 of this report) should also be borne in mind: the amount of artefacts recovered can be dependent upon a number of environmental and land-use factors. | 4.3.26 | <i>Post-medieval (AD 1540–1800): pottery and ceramic building material (CH004.15.54)</i>   |
| 4.3.20 | The following provides a brief description of each of the main periods/categories of recovered artefacts. A detailed report on the finds begins in Section 4.3.27 of this report. The artefact distributions are depicted on Figures CH004.15.53–54.  | 4.3.27 | Five sherds of post-medieval pottery dating to the later 17th or 18th centuries were recovered. A total of 24g of post-medieval Ceramic building material was recovered from two locations.  |
| 4.3.21 | <i>Prehistoric (pre-AD 43): flint (CH004.15.53)</i><br>A total of 72 pieces of modified flint were recovered. Of these, 68 are worked, with the remaining four being unworked pieces of burnt flint. Dateable flint types include:  | 4.3.28 | <i>Other material (industrial residues) (CH004.15.54)</i>  |
|        |   |        | A small quantity (63g) of ironworking slag was recovered from three locations within Field 2. This material is indeterminate of process, and is not dateable.  |
|        |   |        | <b>The finds</b>   |
|        |   | 4.3.29 | The following is a detailed report on the artefactual material recovered from the site during the fieldwalking survey.   |
|        |   | 4.3.30 | The surface-collected finds were recorded directly to an Ms Access database and their positions were plotted using ARCview GIS software. All pottery was quantified by sherd count and weight according to period, and a note was made of fabrics or vessel forms where discernible. Prehistoric worked flint was quantified by count and class (flakes/cores/tools), with further note made of pieces with secondary working and other characteristics. The ceramic building material was recorded by period group and weight and metallurgical residues were recorded by weight and according to broad category. The finds are discussed according to period and category. |
|        |   | 4.3.31 | <i>Prehistoric worked flint</i>  |
|        |   |        | A total of 72 modified pieces of flint was recovered: 68 worked items and four unworked pieces of burnt flint. The raw material mostly consists of good quality black and dark grey flint, with a few items on pale grey and one honey-coloured piece of flint. Twenty-five per cent of the items are broken, which is unsurprising in a surface-collected assemblage.   |
|        |   |        | The flints which resulted from primary flint knapping technology were: three blades, four bladelets, 39 flakes, five cores (one of which was burnt), one core fragment and three chunks. The blades and bladelets are probably Mesolithic or Early Neolithic in date. It is not generally possible to date isolated flakes. The five cores featured multiple striking platforms, which are typical of the Later Neolithic. All but one of the cores were very small, which is also a common characteristic of Neolithic cores.   |
|        |   |        | The reworked flints consisted of three arrowheads, three scrapers (including one thumbnail type), one burnt scraper or knife, one combined denticulate and scraper or knife tool, two  |

<sup>70</sup> Cotswold Archaeology (2013).

|  |  |
|--|--|
| choppers, one retouched flake and two retouched pieces. The barbed and tanged arrowhead had been invasively retouched on one face and had edge retouch on the other face. It conforms most closely to the Sutton B type according to Green's classification system <sup>71</sup> . This tool dates to the Later Neolithic/Early Bronze Age. The hollow-based arrowhead has not been invasively retouched on either face, which is typical for this type. It is relatively rare in Britain and dates to the Later Neolithic. The oblique arrowhead has been retouched along just one edge, but on both faces, which is common in this type. The tip has broken off, as has the base, which would also often feature retouch. This arrowhead type also belongs in the Later Neolithic. | Towcester, Northants. This fabric is common in medieval assemblages in the county, and dates in the range circa 1250–1500 <sup>72</sup> .  |
| 4.3.32 The thumbnail scraper is associated with the Later Neolithic and Early Bronze Age periods. The other scrapers are general types which were in use throughout the prehistoric period. The same is true of the choppers and retouched items. A chopper (sometimes called a chopper core) is a pebble which has had flakes removed from opposing faces along the same edge, to produce a cutting edge. It may, alternatively, have functioned as a core. They are sometimes found on Mesolithic or Later Bronze Age sites.   | 4.3.38 The quantity of medieval pottery is small and is unlikely to be representative of significant activity relating to this period. A tendency towards the south-western portion of the survey area can be demonstrated, with six of the eight recovered sherds being recovered from Field 2.   |
| 4.3.33 Both choppers, the largest core, the core fragment and two of the scrapers were created on pieces of flint which had been used previously. Most of these displayed old patination which had been removed by the second episode of working. The scavenging of previously-used flint items to make new tools is a typical feature of the Later Neolithic and, in particular, the Bronze Age.  | <b>Post-medieval/modern pottery</b><br>Very small quantities of post-medieval pottery were recorded (five sherds, weighing a total of 43g). The small group comprises sherds in yellow slipware, English stoneware and black and clear-glazed earthenwares. Most or all of this material probably dates to the later post-medieval period (later 17th or 18th centuries). No clear spatial tendencies can be demonstrated.   |
| 4.3.34 <b>Worked flint: distribution</b><br>Worked flint was recovered from all three fields, but predominantly from Field 1. Field 1 displayed a general spread of flint but there was a higher concentration in the northern end of the field, particularly in transects J, K and L. The blades and bladelets were spread across Field 1. One tool was recovered from Field 3, none from Field 2 and the remainder from Field 1. Tools were mostly recovered from the eastern half of Field 1, again with a higher concentration in the northern end. Field 1 transects F, J and L and stints 20, 80, 120 and 160 each produced more than one tool.  | 4.3.40 <b>Post-medieval ceramic building material</b><br>Ceramic building material characteristic of this period amounts to 24g, recorded from two locations (F1/C/o and F3/C/140). In both instances, the material consists of small, flat fragments in a hard, red-firing fabric.  |
| 4.3.35 The few pieces of burnt flint were spread across the fieldwalking area, although none were recovered from Field 3.  | 4.3.41 <b>Other material (industrial residues)</b><br>A small quantity of ironworking slag (63g), indeterminate of process (smithing/smelting), was recorded from three grid locations. The date of the recorded material is not determinable, though it may be significant that its distribution (from within Field 2), broadly coincides with that of the medieval pottery.  |
| 4.3.36 The flints suggest activity focused in the northern and eastern areas of Field 1 throughout the earlier prehistoric period (Mesolithic, Neolithic and Bronze Age).  | <b>Results: interpretation</b><br>Worked flints were recovered from all three fields, but the majority came from Field 1, with the highest concentrations of flints lying within the northern and eastern parts of this field. It is possible that the greater number of flints retrieved from Field 1 was partially a result of the better survey conditions in this area of the site (see Section 4.3.15); it is likely, however, that the concentration of worked flint within Field 1 indicates that this area of the site was a focus of activity throughout the Mesolithic, Neolithic and Bronze Age eras (circa 10,000–circa 700 BC). This tallies with cropmark evidence suggesting that the eastern part of the site is within the edge of a possible prehistoric settlement (see Section 4.3.6). |
| 4.3.37 <b>Medieval pottery</b><br>A small quantity of medieval pottery (eight sherds, weighing a total of 24g) was recovered from seven locations. All sherds are abraded and small, factors that make identification difficult. The majority comprise bodysherds in unglazed sandy coarsewares. Three sherds are tentatively identified as Northamptonshire fabric CTS 329, a type made at Potterpury, near   | 4.3.42 The recovered quantity of medieval pottery is small and is unlikely to be representative of significant activity during this period.  |
|  | <b>Conclusions</b><br>A concentration of worked flint within Field 1 suggests that this area of the site was a focus of activity throughout the Mesolithic, Neolithic and Bronze Age eras (circa 10,000–circa 700 BC). These results tally with and expand upon cropmark evidence for a series of prehistoric enclosures and associated features in the north-eastern part of the survey area.   |

<sup>71</sup> Green, H. S., (1980), *The Flint Arrowheads of the British Isles: A detailed study of materials from England and Wales with comparanda from Scotland and Ireland Part I*, BAR British Series 75(1).

<sup>72</sup> McCarthy, M. (1979), *The pottery*, Williams, J.H, St Peter's Street Northampton: Excavations 1973–1976, Northampton Development Corporation Archaeological Monograph, No. 21979, Pg. 162.

4.3.45 There were no artefacts associated with the Battle of Edgcote, suggesting that the site did not form part of the battlefield.

#### 4.4 References

British Geological Survey; Geology of Britain Viewer; [http://maps.bgs.ac.uk/geologyviewer\\_google/googleviewer.html](http://maps.bgs.ac.uk/geologyviewer_google/googleviewer.html); Accessed: 28 February 2013.

Cotswold Archaeology (2013), *HS2 Northamptonshire: Written Scheme of Investigation for an Archaeological Fieldwalking Survey*.

English Heritage (1991), *Management of Archaeological Projects* 2.

English Heritage (2006) *Management of Research Projects in the Historic Environment (MoRPHE): Project Manager's Guide*.

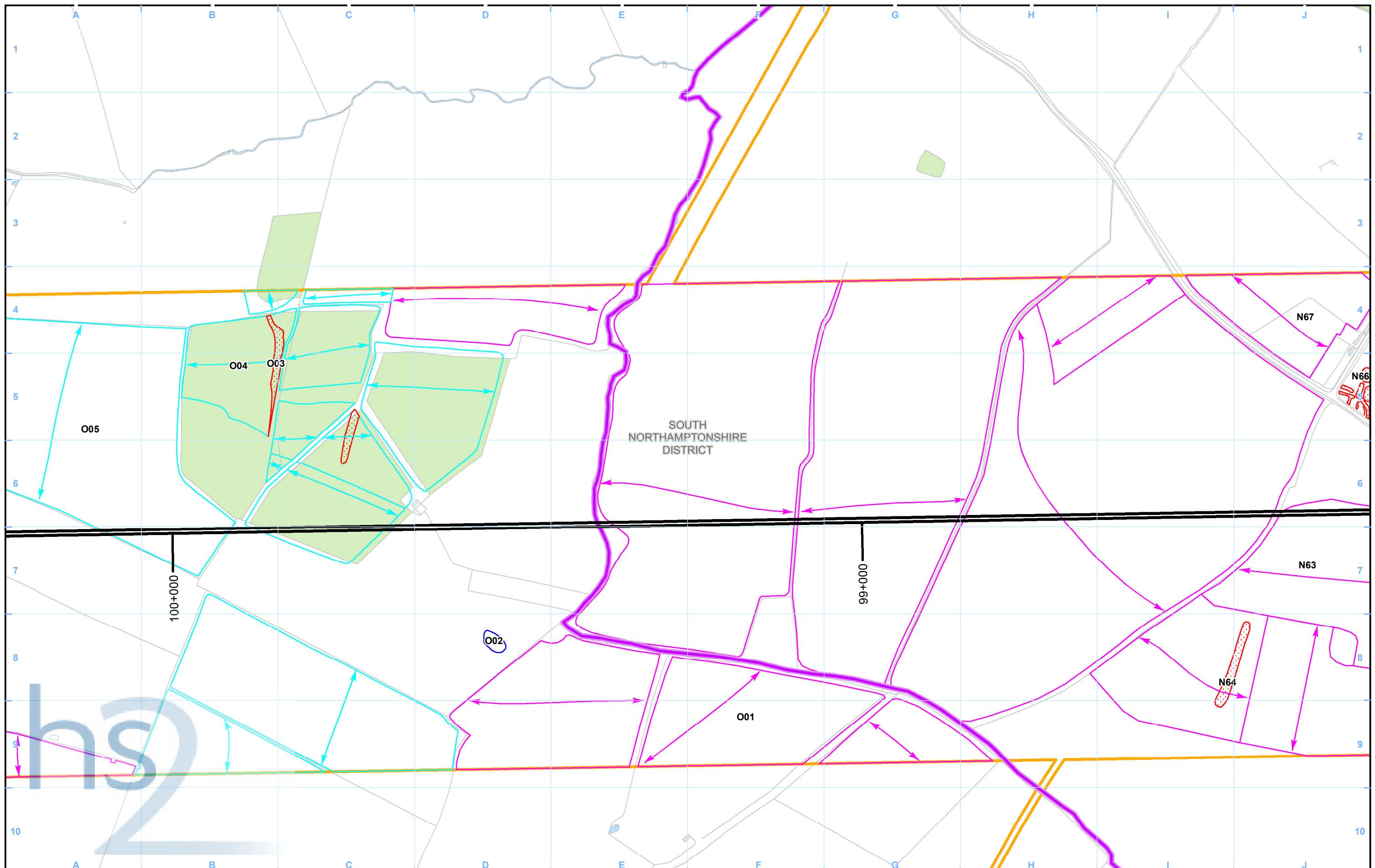
Green, H. S. (1980), *The Flint Arrowheads of the British Isles: A detailed study of materials from England and Wales with comparanda from Scotland and Ireland Part I*, BAR British Series 75(i).

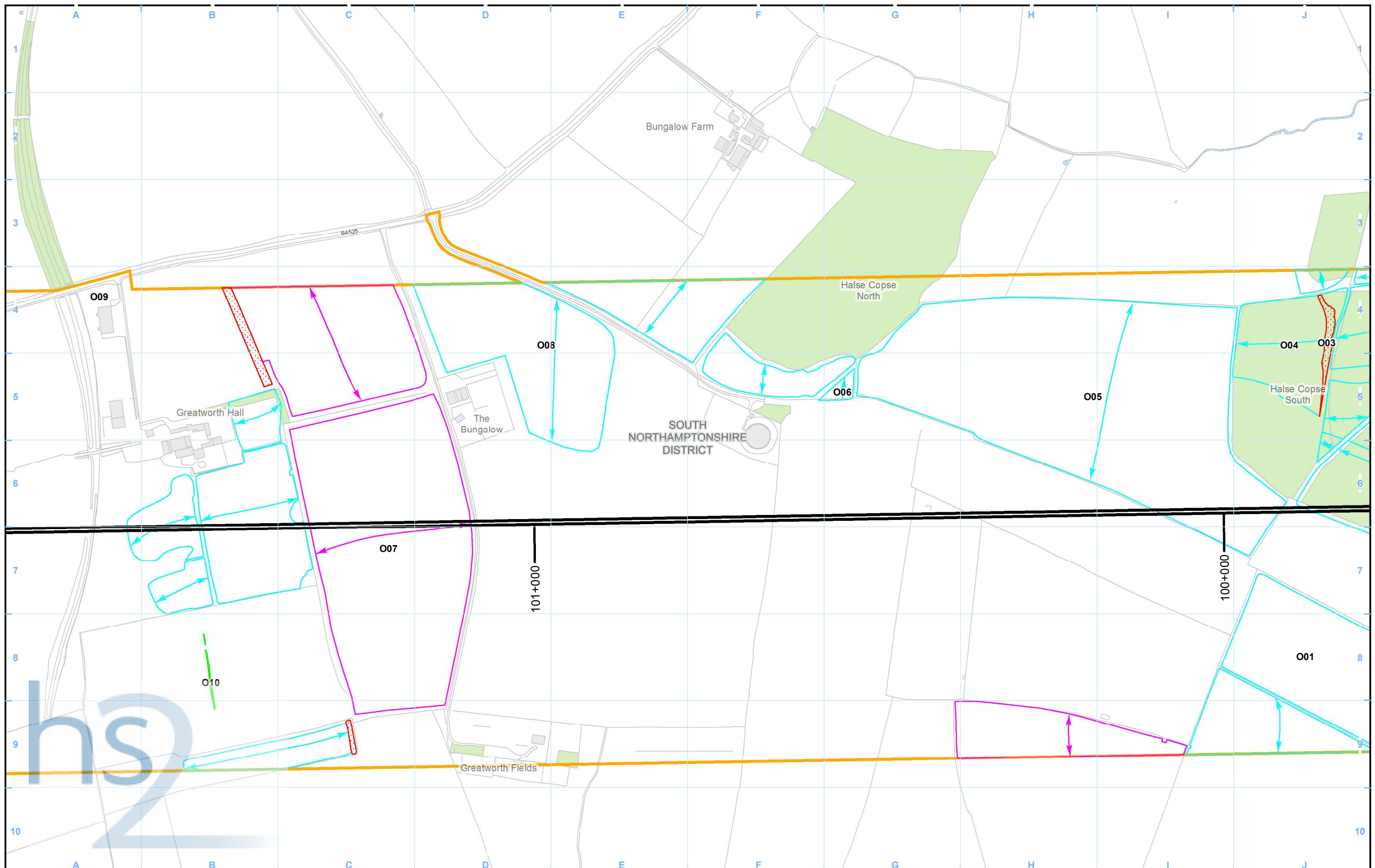
Institute for Archaeologists (2008), *Standard and Guidance for Archaeological Field Evaluation*.

McCarthy, M. (1979), The pottery, Williams, J.H, St Peter's Street Northampton: Excavations 1973–1976, *Northampton Development Corporation Archaeological Monograph*, No. 21979, Pgs. 151–230

#### 4.5 Figures

|  |          |
|--|----------|
| CH-004-15-47 OUoAB: Site location plan                                   | 1:25,000 |
| CH-004-15-48 OUoAB: Prehistoric finds                                    | 1:1,915  |
| CH-004-15-49 OUoAB: Medieval and post-medieval/modern finds              | 1:2,500  |
| CH-004-15-50 OUoAC: Site location plan                                   | 1:25,000 |
| CH-004-15-51 OUoAC: Medieval and post-medieval finds                     | 1:2,000  |
| CH-004-15-52 CHoAB: Site location plan                                   | 1:25,000 |
| CH-004-15-53 CHoAB: Prehistoric finds                                    | 1:2,500  |
| CH-004-15-54 CHoAB: Medieval finds, post-medieval finds and undated slag | 1:2,500  |



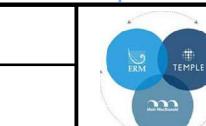


**Legend**

- Route in tunnel
- Route on surface
- Community forum boundary
- District/Borough boundary
- Watercourse
- Water body
- Woodland
- Remote sensing survey boundary
- Archaeological features
- Bank
- Ditch
- Extant ridge and furrow direction
- Levelled ridge and furrow direction
- Structure
- T-Hachure
- Extent of Area
- Bank
- Ditch
- Extant ridge and furrow outline
- Levelled ridge and furrow outline
- Structure
- Large cut feature

Location Map

Map Number: CH-004-15.02  
 Map Name: Remote Sensing Survey Interpretation  
 Community Forum Area CFA15: Greatworth to Lower Boddington



ETM accept no responsibility for any circumstances, which arise from the reproduction of this map after alteration, amendment or abbreviation or if it is issued in part or issued incomplete in any way.

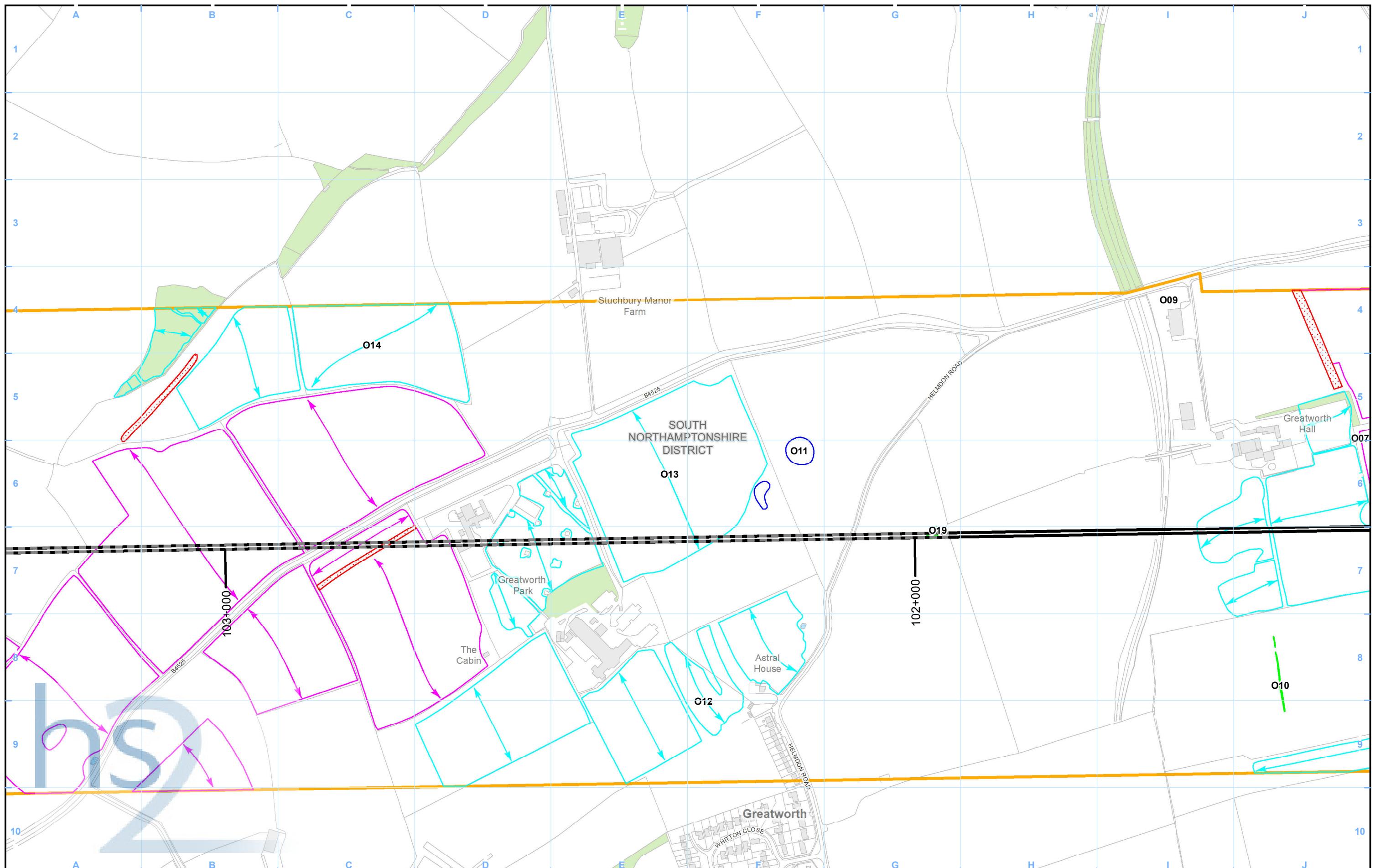


Scale at A3: 1:5,000

0 50 100 150 200  
 Metres

© Crown copyright and database rights 2013.  
 Ordnance Survey Licence Number 100049190.  
 Doc Number: C252-ETM-EV-MAP-020-002609-P03.00

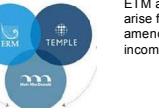
Date: 06/09/13

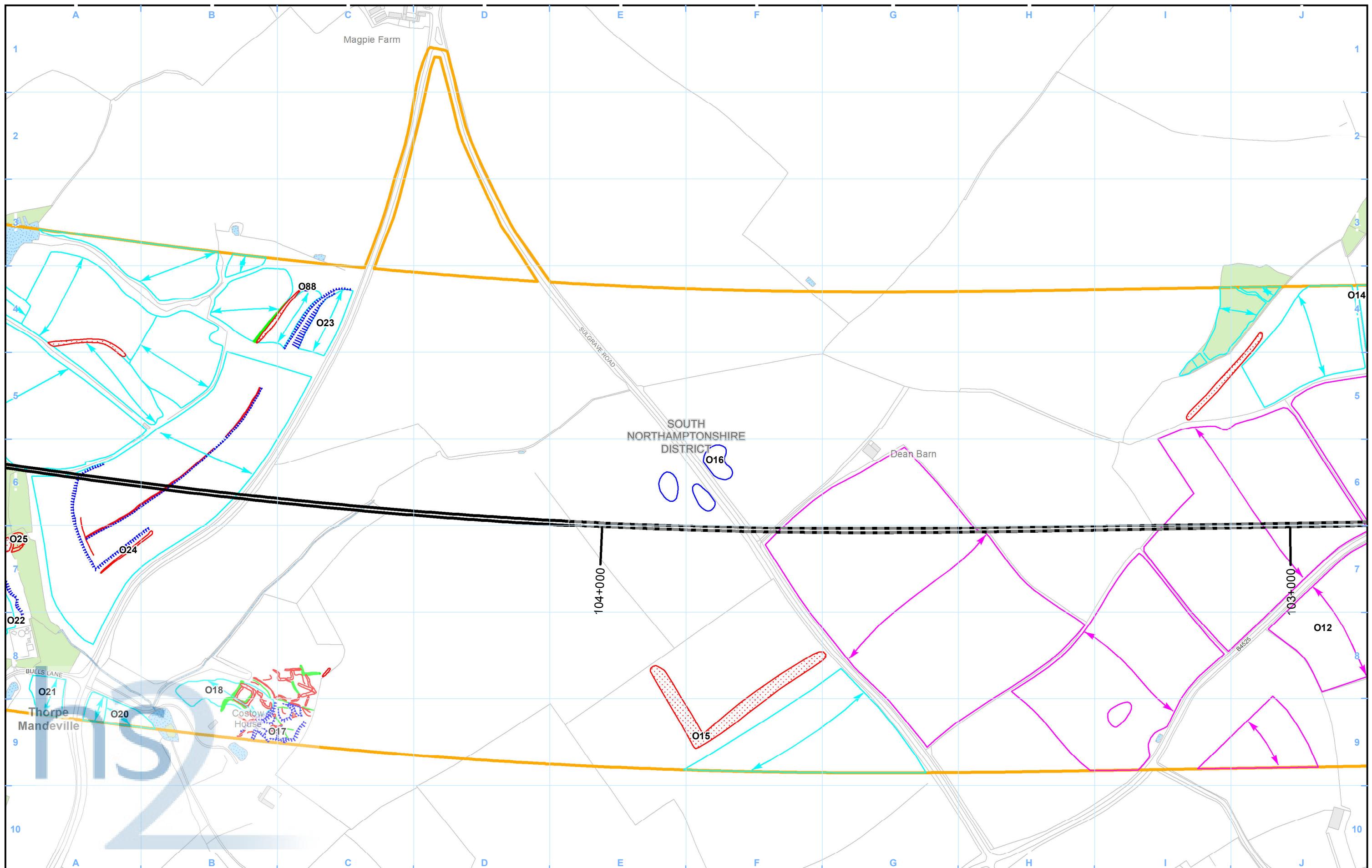


**Legend**

- Route in tunnel
- Route on surface
- Community forum boundary
- District/Borough boundary
- Watercourse
- Water body
- Woodland
- Remote sensing survey boundary
- Extant ridge and furrow direction
- Levelled ridge and furrow direction
- Structure
- T-Hachure
- Archaeological features
- Bank
- Ditch
- Extant ridge and furrow outline
- Levelled ridge and furrow outline
- Structure
- Large cut feature
- Extent of Area
- Bank
- Ditch
- Extant ridge and furrow outline
- Levelled ridge and furrow outline
- Structure
- Large cut feature

**Location Map**

|   |                                      |   |  |
|---|--------------------------------------|---|--|
| Map Number  | CH-004-15.03                         |  |  |
| Map Name  | Remote Sensing Survey Interpretation |   |  |
| Community Forum Area CFA15: Greatworth to Lower Boddington                            |                                      |   |  |
| © Crown copyright and database rights 2013. Ordnance Survey Licence Number 100049190. |                                      |   |  |
| Scale at A3: 1:5,000  |                                      |   |  |
|  |                                      |   |  |
| Date: 06/09/13  |                                      |   |  |



**Legend**

- Route in tunnel
- Route on surface
- Community forum boundary
- District/Borough boundary
- Watercourse
- Water body
- Woodland
- Remote sensing survey boundary
- Extant ridge and furrow direction
- Levelled ridge and furrow direction
- Structure
- T-Hachure
- Archaeological features
- Bank
- Ditch
- Extant ridge and furrow outline
- Levelled ridge and furrow outline
- Structure
- Large cut feature
- Extent of Area
- Bank
- Ditch
- Extant ridge and furrow outline
- Levelled ridge and furrow outline
- Structure
- Large cut feature

**Location Map**

**Map Number** CH-004-15.04  
**Map Name** Remote Sensing Survey Interpretation  
**Community Forum Area CFA15:** Greatworth to Lower Boddington

ETM accept no responsibility for any circumstances, which arise from the reproduction of this map after alteration, amendment or abbreviation or if it is issued in part or issued incomplete in any way.

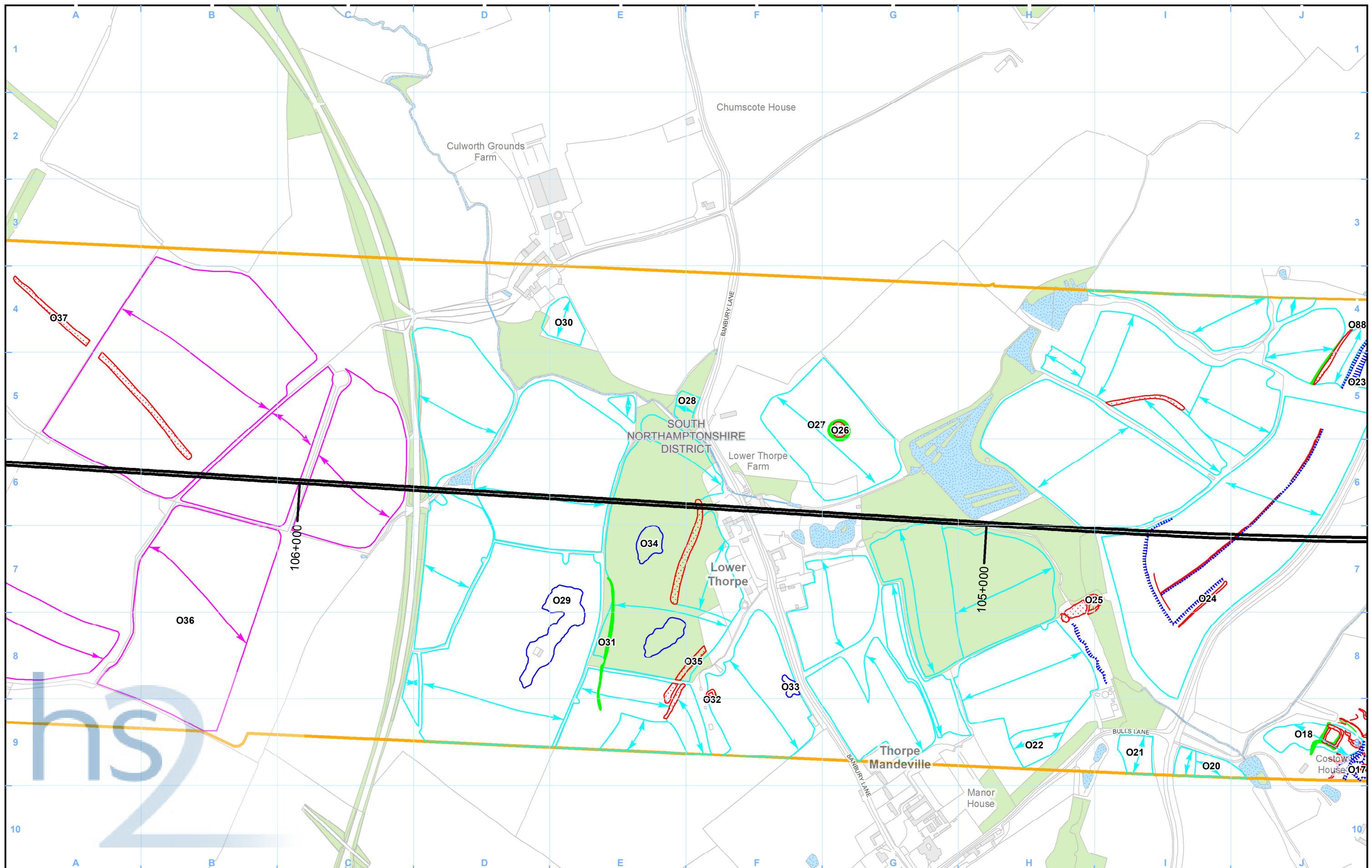
Scale at A3: 1:5,000

0 50 100 150 200 Metres

© Crown copyright and database rights 2013. Ordnance Survey Licence Number 100049190.

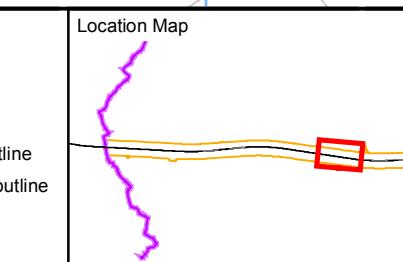
Doc Number: C252-ETM-EV-MAP-020-002611-P03.00

Date: 06/09/13



**Legend**

- Route in tunnel
- Route on surface
- Community forum boundary
- District/Borough boundary
- Watercourse
- Water body
- Woodland
- Remote sensing survey boundary
- Extant ridge and furrow direction
- Levelled ridge and furrow direction
- Structure
- T-Hachure
- Archaeological features
- Bank
- Ditch
- Extant ridge and furrow outline
- Levelled ridge and furrow outline
- Structure
- Large cut feature
- Extent of Area
- Bank
- Ditch
- Extant ridge and furrow outline
- Levelled ridge and furrow outline
- Structure
- Large cut feature



**Map Number**  
**CH-004-15.05**  
**Map Name**  
**Remote Sensing Survey Interpretation**  
**Community Forum Area CFA15: Greatworth to Lower Boddington**

ETM accept no responsibility for any circumstances, which arise from the reproduction of this map after alteration, amendment or abbreviation or if it is issued in part or issued incomplete in any way.

© Crown copyright and database rights 2013. Ordnance Survey Licence Number 100049190.

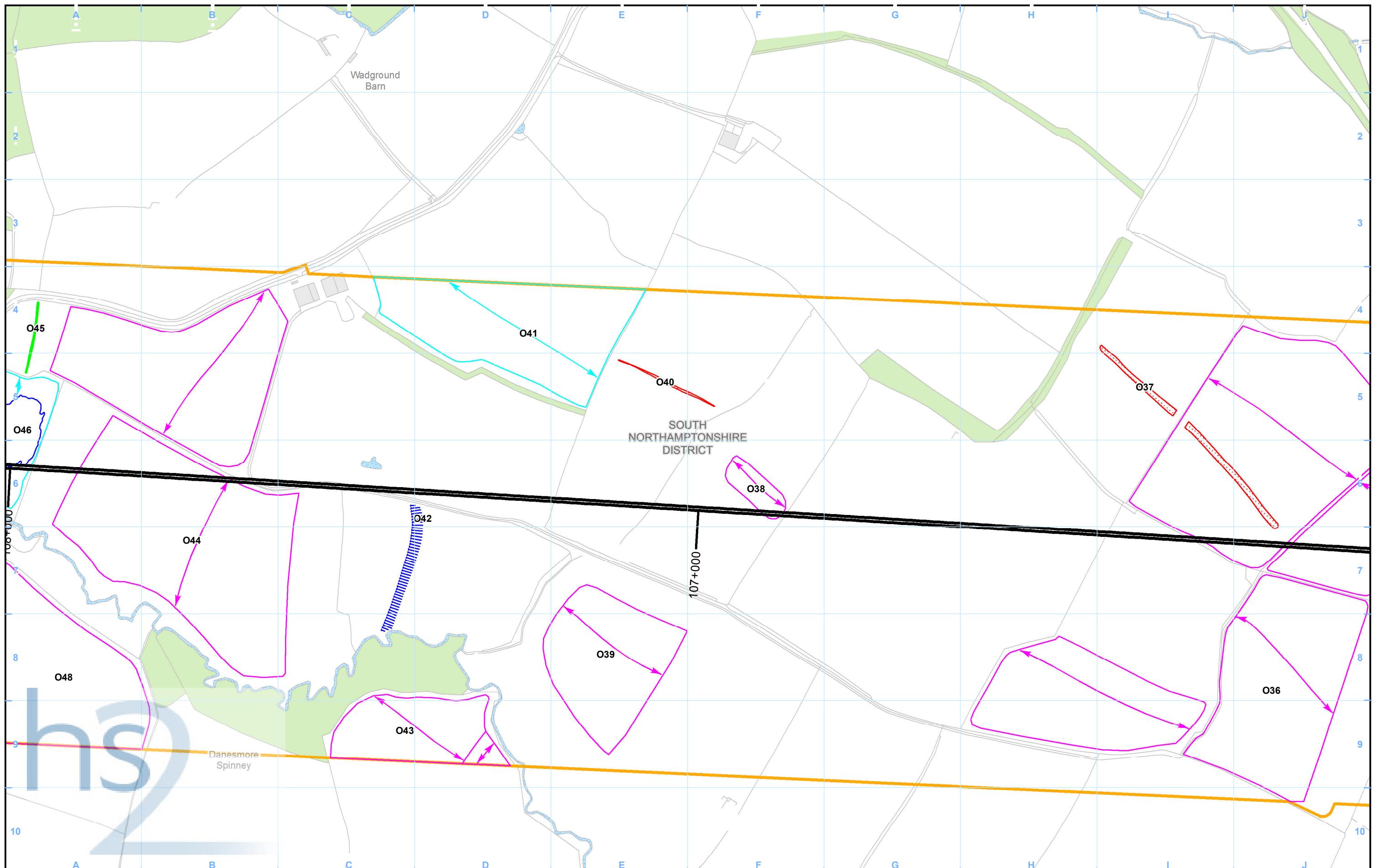
Scale at A3: 1:5,000

0 50 100 150 200 Metres

© Crown copyright and database rights 2013. Ordnance Survey Licence Number 100049190.

Doc Number: C252-ETM-EV-MAP-020-002612-P03.00

Date: 06/09/13



**Legend**

- Route in tunnel
- Route on surface
- Community forum boundary
- District/Borough boundary
- Watercourse
- Water body
- Woodland

Remote sensing survey boundary

Archaeological features

Bank

Ditch

Extant ridge and furrow direction

Levelled ridge and furrow direction

Structure

T-Hachure

Bank

Ditch

Extant ridge and furrow outline

Levelled ridge and furrow outline

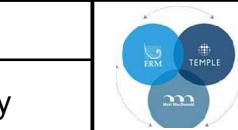
Structure

Structure

Large cut feature

**Location Map**

**Map Number** CH-004-15.06  
**Map Name** Remote Sensing Survey Interpretation  
**Community Forum Area CFA15:** Greatworth to Lower Boddington



ETM accept no responsibility for any circumstances, which arise from the reproduction of this map after alteration, amendment or abbreviation or if it is issued in part or issued incomplete in any way.



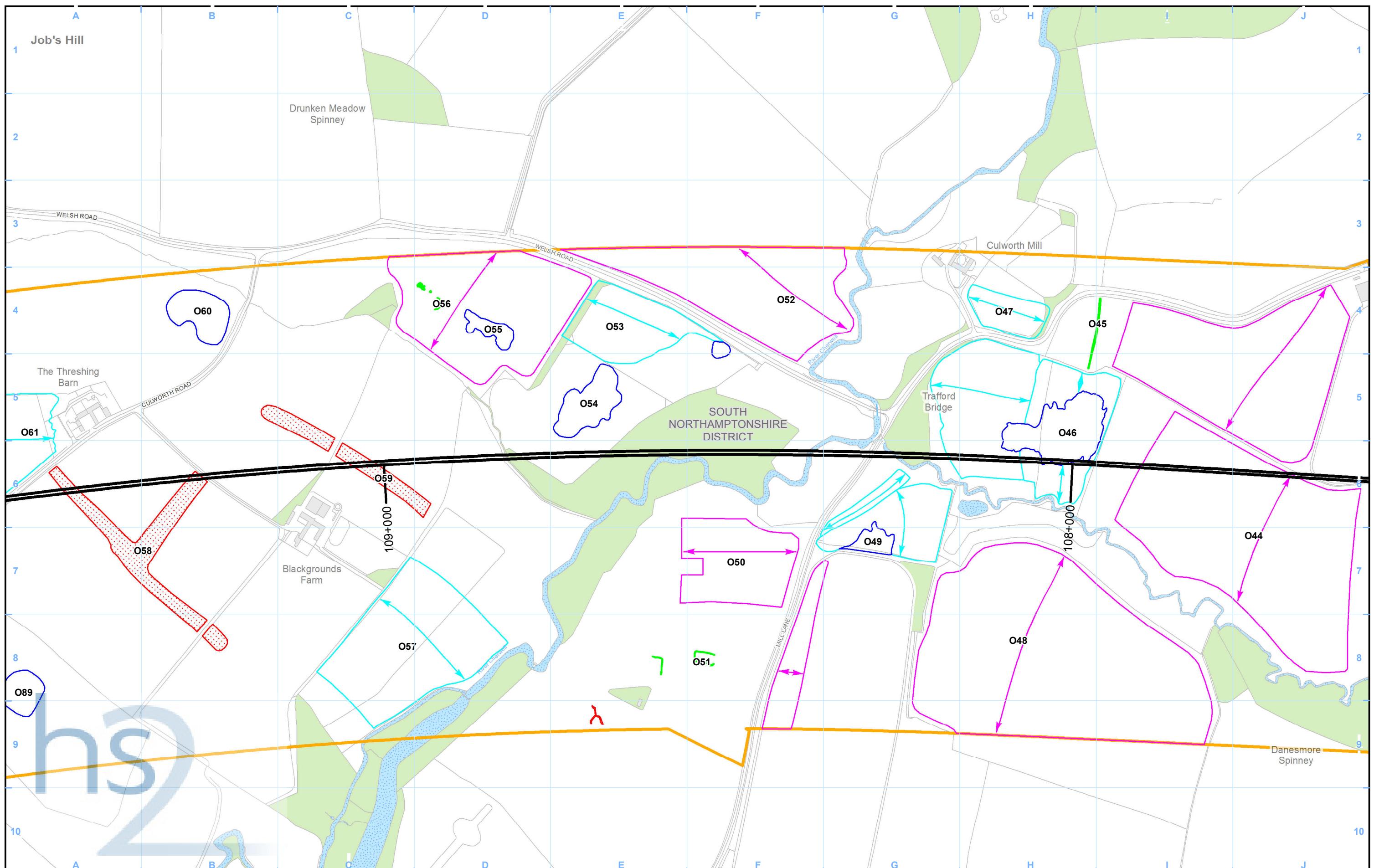
Scale at A3: 1:5,000

0 50 100 150 200 Metres

© Crown copyright and database rights 2013. Ordnance Survey Licence Number 100049190.

Doc Number: C252-ETM-EV-MAP-020-002613-P03.00

Date: 06/09/13



**Legend**

- Route in tunnel
- Route on surface
- Community forum boundary
- District/Borough boundary
- Watercourse
- Water body
- Woodland

**Remote sensing survey boundary**

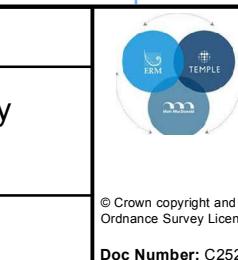
- Archaeological features
- Bank
- Ditch
- Extant ridge and furrow direction
- Levelled ridge and furrow direction
- Structure
- T-Hachure

**Archaeological features**

- Extent of Area
- Bank
- Ditch
- Extant ridge and furrow outline
- Levelled ridge and furrow outline
- Structure
- Structure
- Large cut feature

**Location Map**

**Map Number** CH-004-15.07  
**Map Name** Remote Sensing Survey Interpretation  
**Community Forum Area CFA15:** Greatworth to Lower Boddington



ETM accept no responsibility for any circumstances, which arise from the reproduction of this map after alteration, amendment or abbreviation or if it is issued in part or issued incomplete in any way.

© Crown copyright and database rights 2013. Ordnance Survey Licence Number 100049190.

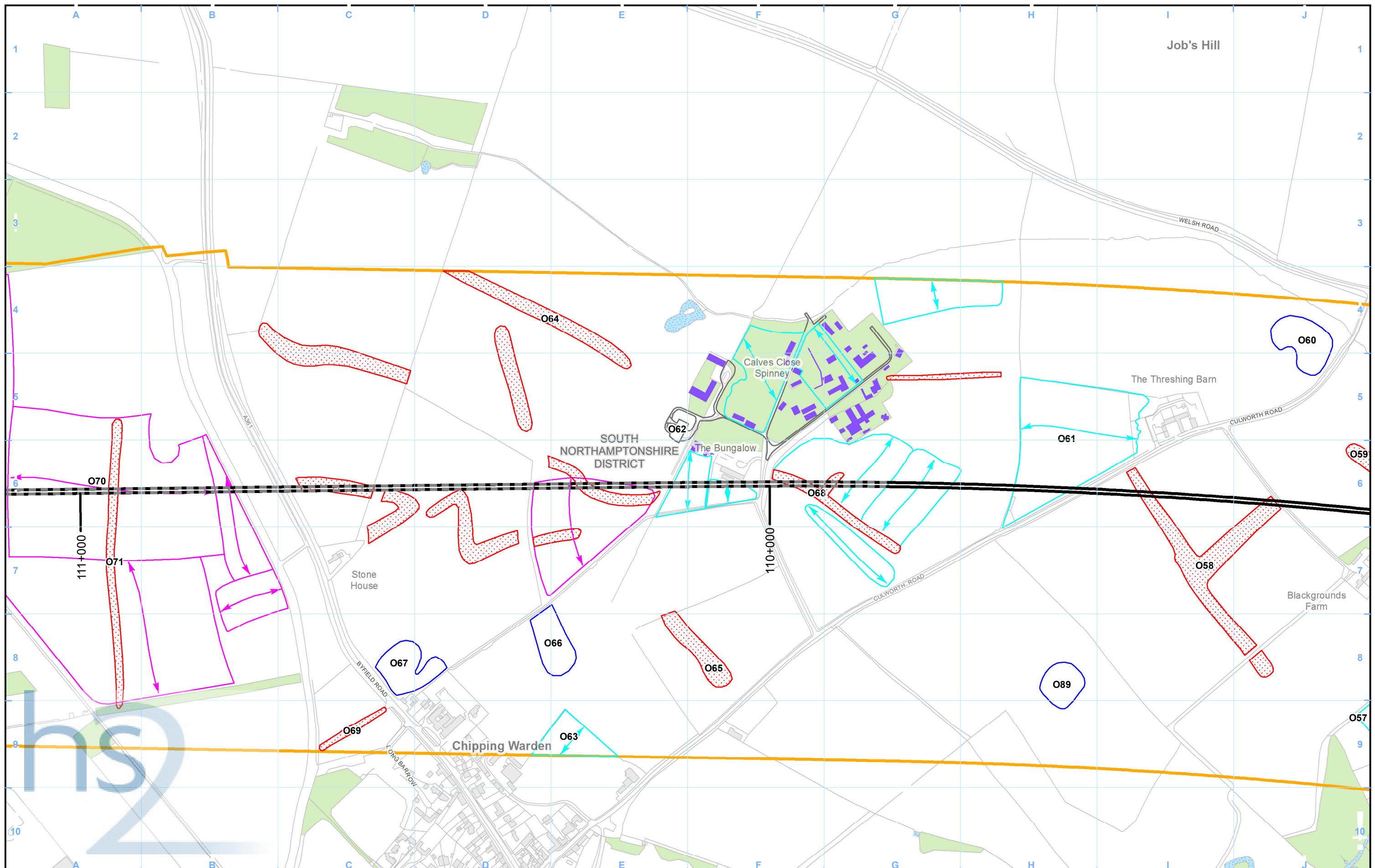
Scale at A3: 1:5,000

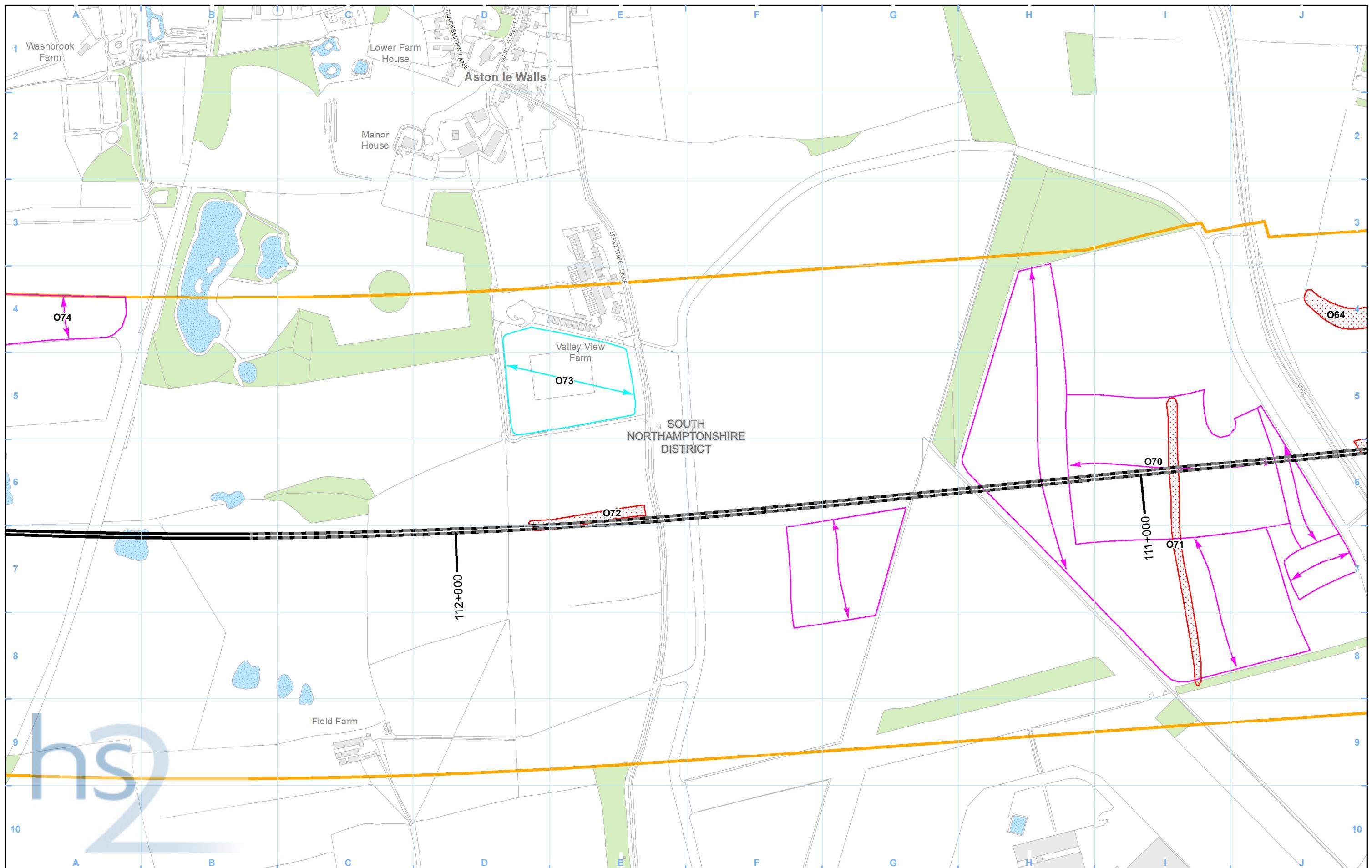
0 50 100 150 200 Metres

Doc Number: C252-ETM-EV-MAP-020-002614-P03.00



Date: 06/09/13





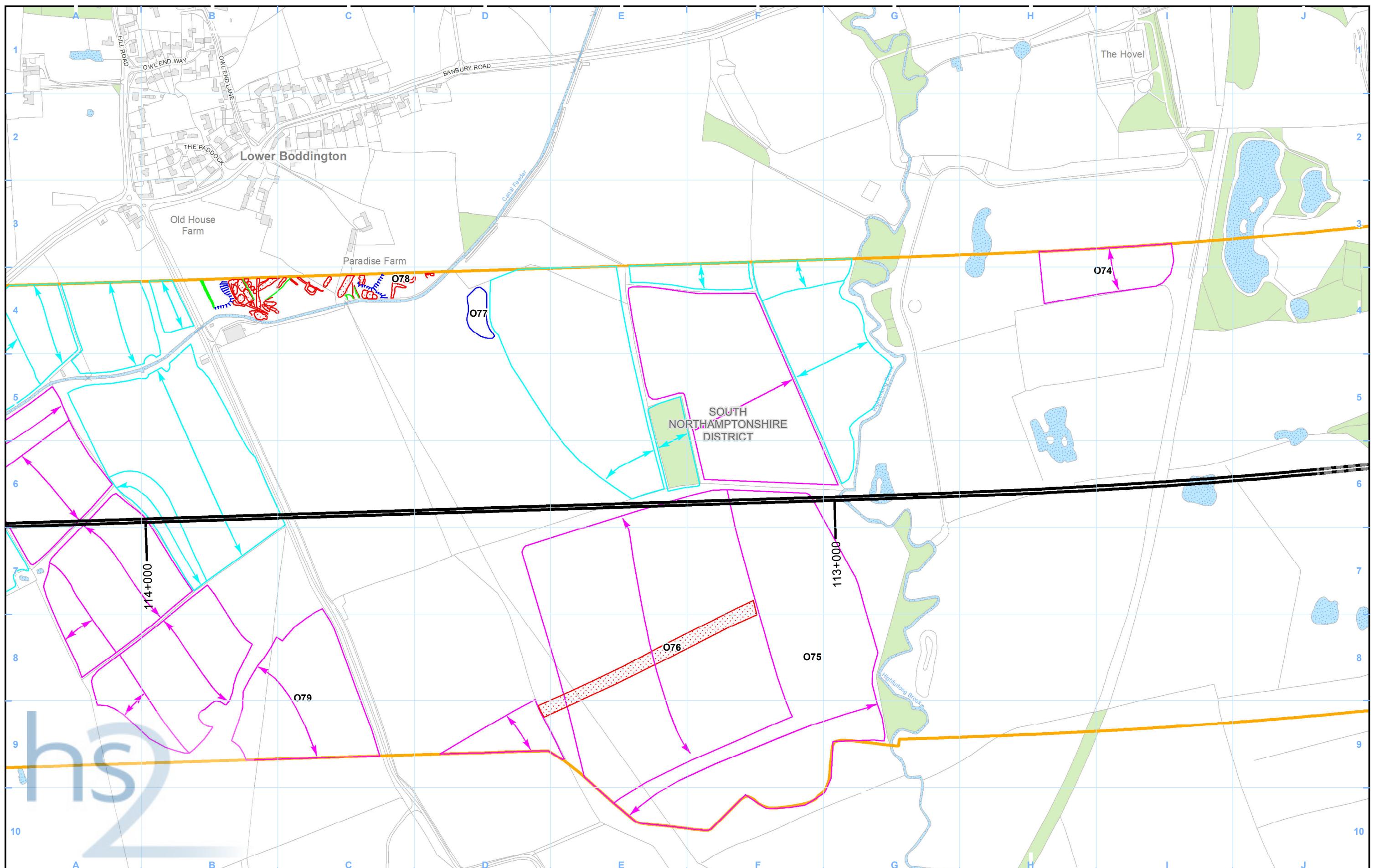
**Legend**

- Route in tunnel
- Route on surface
- Community forum boundary
- District/Borough boundary
- Watercourse
- Water body
- Woodland
- Remote sensing survey boundary
- Extant ridge and furrow direction
- Levelled ridge and furrow direction
- Structure
- T-Hachure
- Archaeological features
- Bank
- Ditch
- Extant ridge and furrow outline
- Levelled ridge and furrow outline
- Structure
- Large cut feature
- Extent of Area
- Ditch
- Bank
- Structure
- Large cut feature

**Location Map**

|   |   |   |  |  |
|---|---|---|--|--|
| Map Number  | CH-004-15.09                                | ETM accept no responsibility for any circumstances, which arise from the reproduction of this map after alteration, amendment or abbreviation or if it is issued in part or issued incomplete in any way. |  |  |
| Map Name  | <b>Remote Sensing Survey Interpretation</b> |   |  |  |
| Community Forum Area CFA15: Greatworth to Lower Boddington                            |   |   |  |  |
| © Crown copyright and database rights 2013. Ordnance Survey Licence Number 100049190. |   |   |  |  |
| Doc Number:   | C252-ETM-EV-MAP-020-002616-P03.00           | Date: 06/09/13  |  |  |





**Legend**

- Route in tunnel
- Route on surface
- Community forum boundary
- District/Borough boundary
- Watercourse
- Water body
- Woodland

Remote sensing survey boundary

Archaeological features

Extant ridge and furrow direction

Levelled ridge and furrow direction

Structure

T-Hachure

Extent of Area

Bank

Ditch

Extant ridge and furrow outline

Levelled ridge and furrow outline

Structure

Large cut feature

**Location Map**

|                             |                                      |   |
|-----------------------------|--------------------------------------|---|
| Map Number                  | CH-004-15.10                         |  |
| Map Name                    | Remote Sensing Survey Interpretation |   |
| Community Forum Area CFA15: | Greatworth to Lower Boddington       |   |

ETM accept no responsibility for any circumstances, which arise from the reproduction of this map after alteration, amendment or abbreviation or if it is issued in part or issued incomplete in any way.

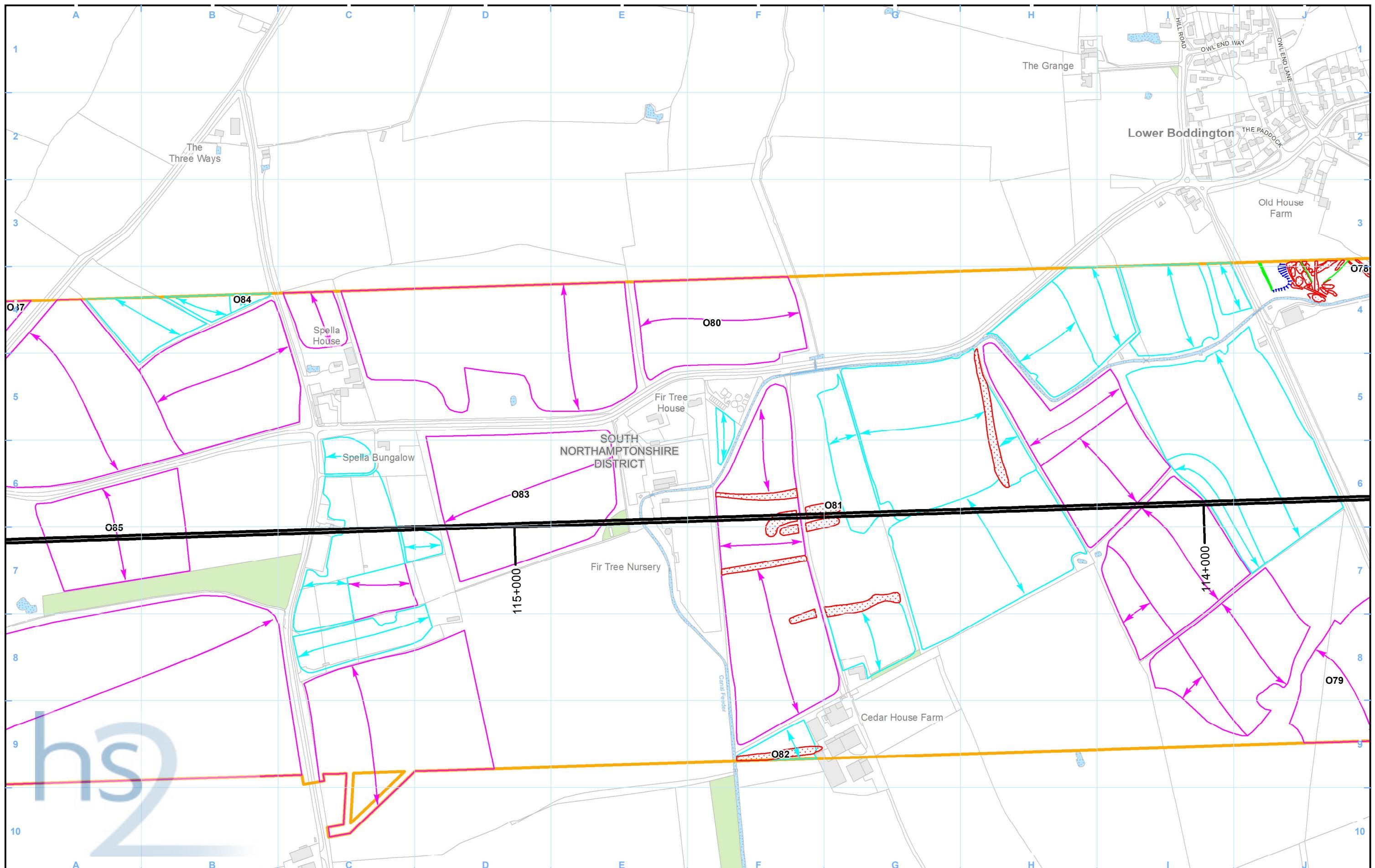
© Crown copyright and database rights 2013. Ordnance Survey Licence Number 100049190.

Scale at A3: 1:5,000

0 50 100 150 200 Metres

Doc Number: C252-ETM-EV-MAP-020-002617-P03.00

Date: 06/09/13



**Legend**

- Route in tunnel
- Route on surface
- Community forum boundary
- District/Borough boundary
- Watercourse
- Water body
- Woodland
- Remote sensing survey boundary
- Archaeological features
- Bank
- Ditch
- Extant ridge and furrow direction
- Levelled ridge and furrow direction
- Structure
- T-Hachure
- Extent of Area
- Bank
- Ditch
- Extant ridge and furrow outline
- Levelled ridge and furrow outline
- Structure
- Large cut feature

**Location Map**

Map Number

CH-004-15.11

Map Name

Remote Sensing Survey  
Interpretation

Community Forum Area CFA15:  
Greatworth to Lower Boddington

© Crown copyright and database rights 2013.  
Ordnance Survey Licence Number 100049190.

Doc Number: C252-ETM-EV-MAP-020-002618-P03.00

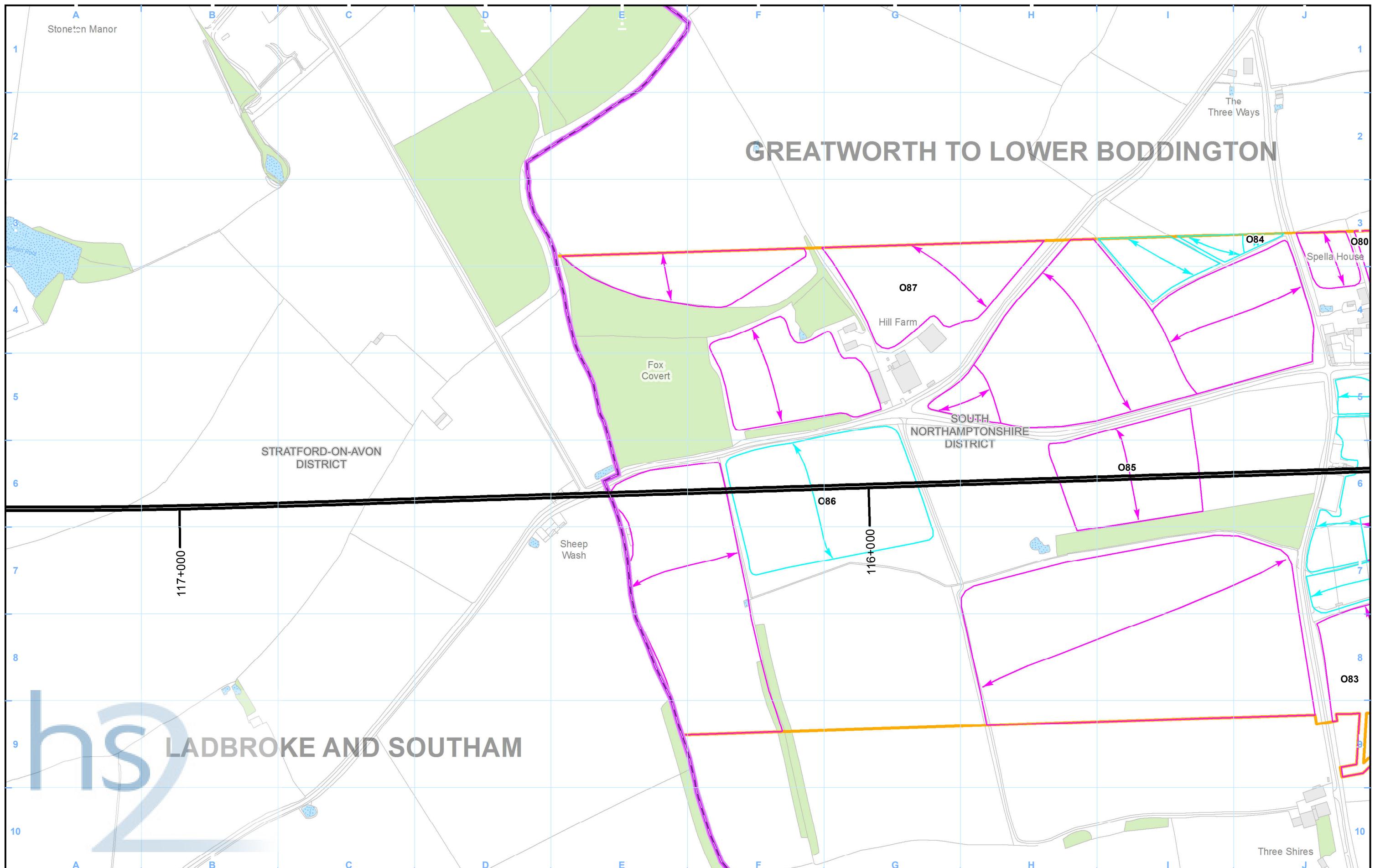
Date: 06/09/13

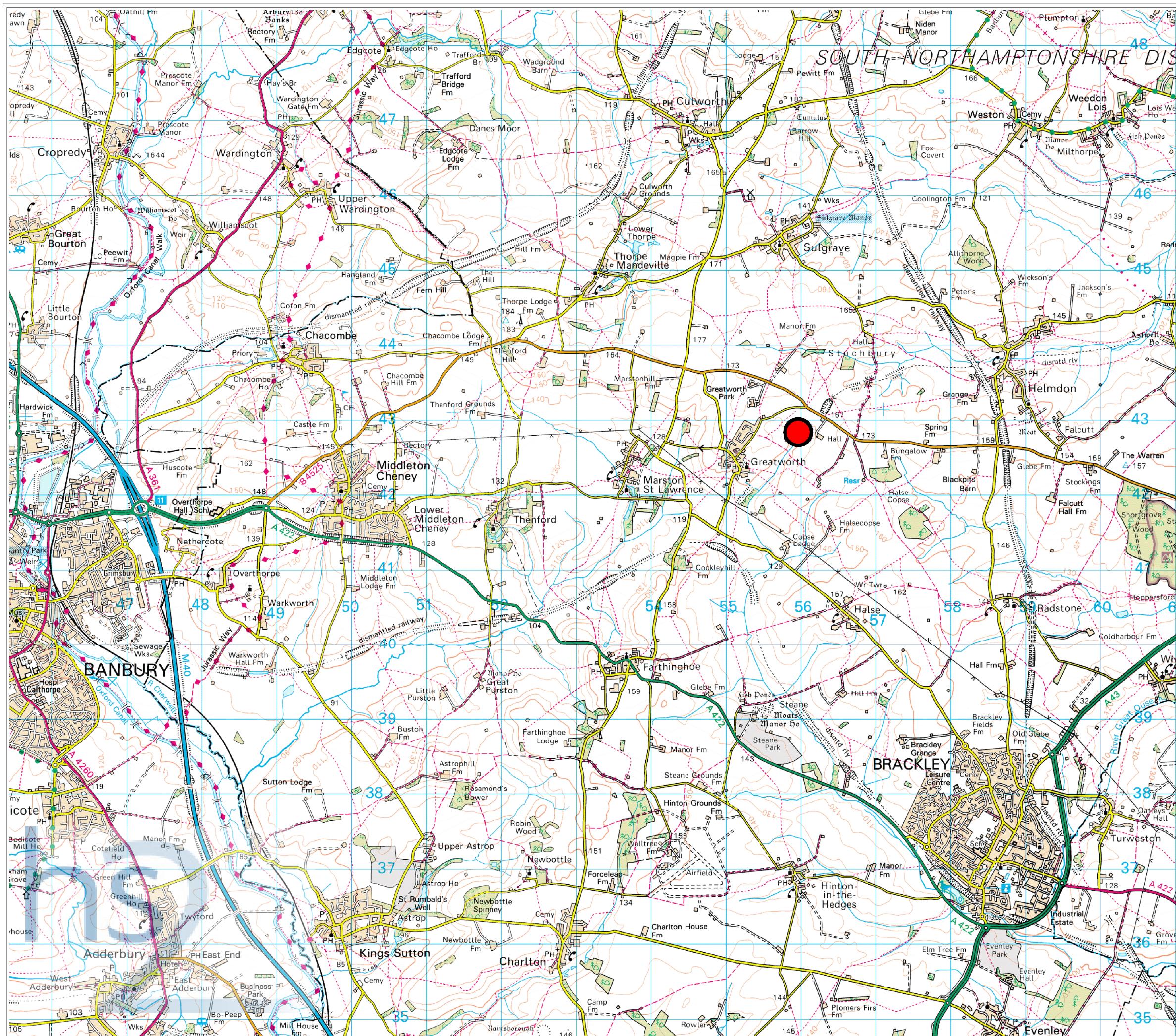


ETM accept no responsibility for any circumstances, which arise from the reproduction of this map after alteration, amendment or abbreviation or if it is issued in part or issued incomplete in any way.

Scale at A3: 1:5,000

0 50 100 150 200  
Metres





Site Location

GSB  
PROSPECTION Ltd  
SUMO

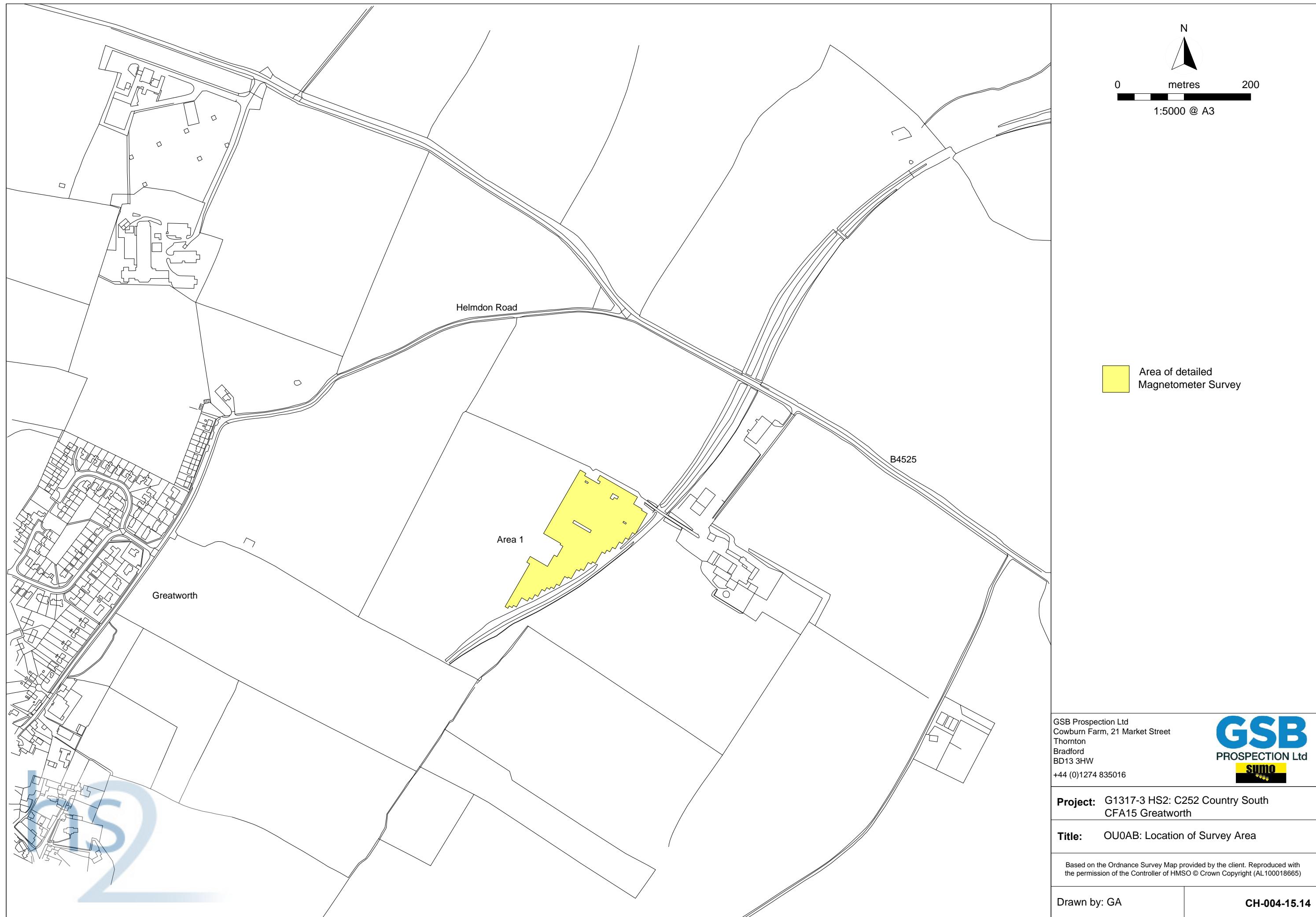
Project: G1317-3 HS2: C252 Country South  
CFA15 Greatworth

Title: OU0AB: Site Location Diagram

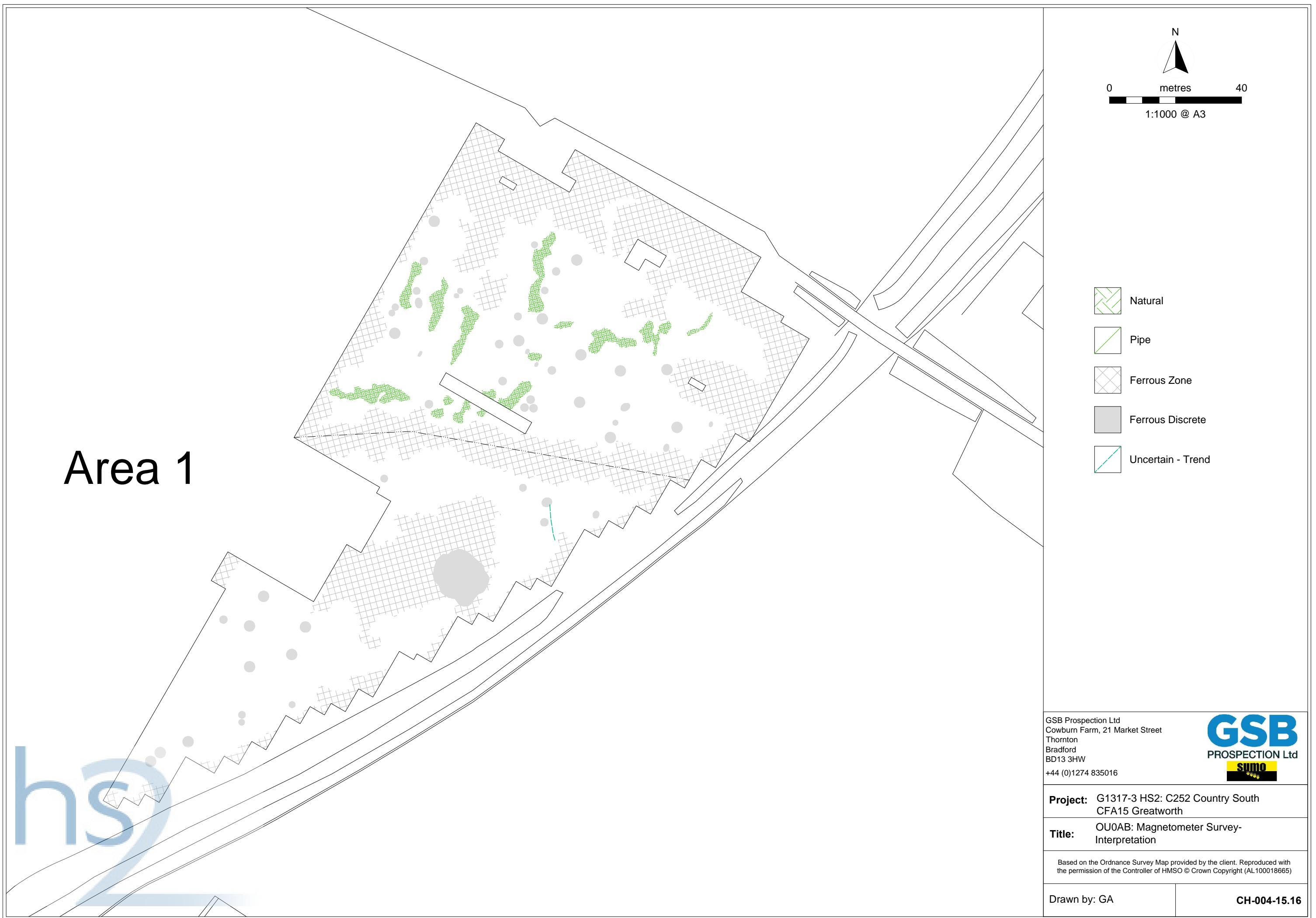
Reproduced from the Ordnance Survey Map with the permission  
of the Controller of HMSO © Crown Copyright (AL100018665)

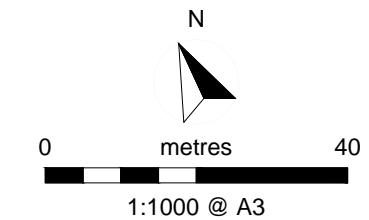
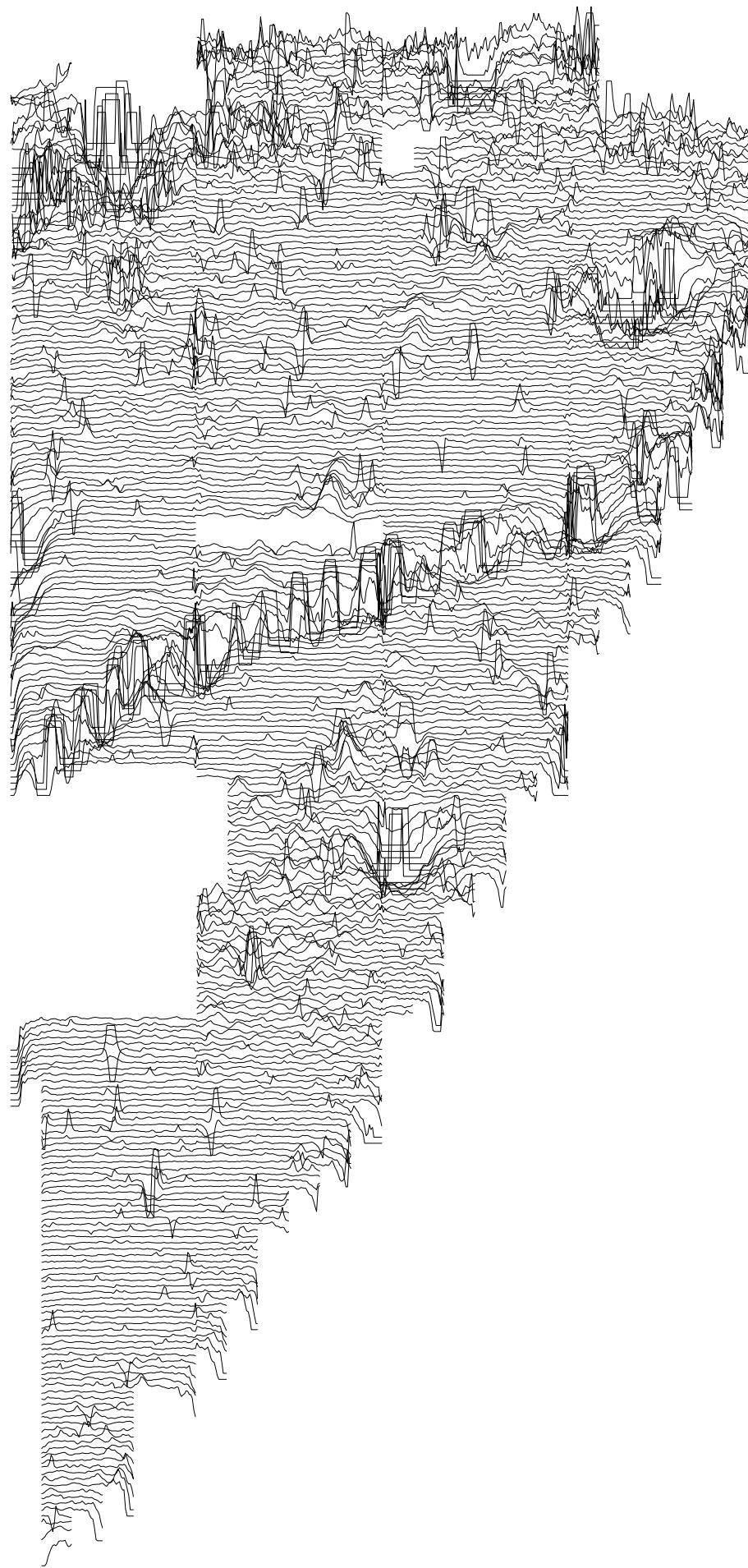
Drawn by: JMT

CH-004-15.13









15 nT

Y axis plot scale: 15nT/cm  
Clip levels: +/-15nT

2  
nT  
-1

GSB Prospection Ltd  
Cowburn Farm, 21 Market Street  
Thornton  
Bradford  
BD13 3HW  
+44 (0)1274 835016

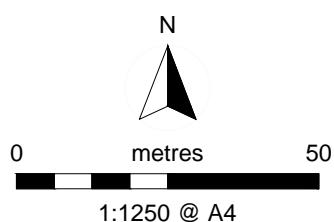
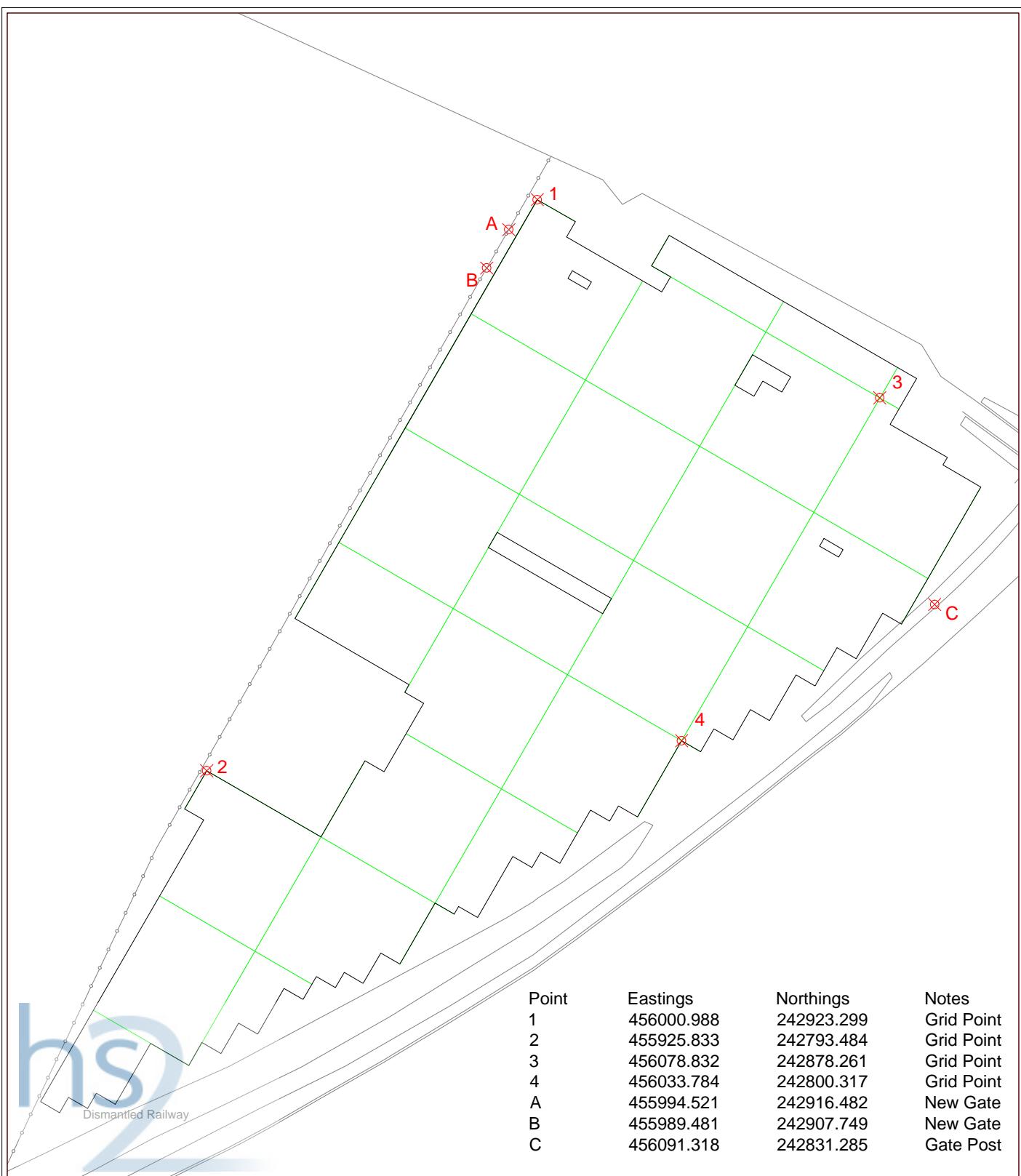
**GSB**  
PROSPECTION Ltd  
SUMO

**Project:** G1317-3 HS2: C252 Country South  
CFA15 Greatworth

**Title:** OU0AB: Magnetic Data :  
XY Trace & Greyscale Plot

Drawn by: GA

CH-004-15.17



GSB Prospection Ltd  
Cowburn Farm, 21 Market Street  
Thornton  
Bradford  
BD13 3HW  
+44 (0)1274 835016

**GSB**  
PROSPECTION Ltd  

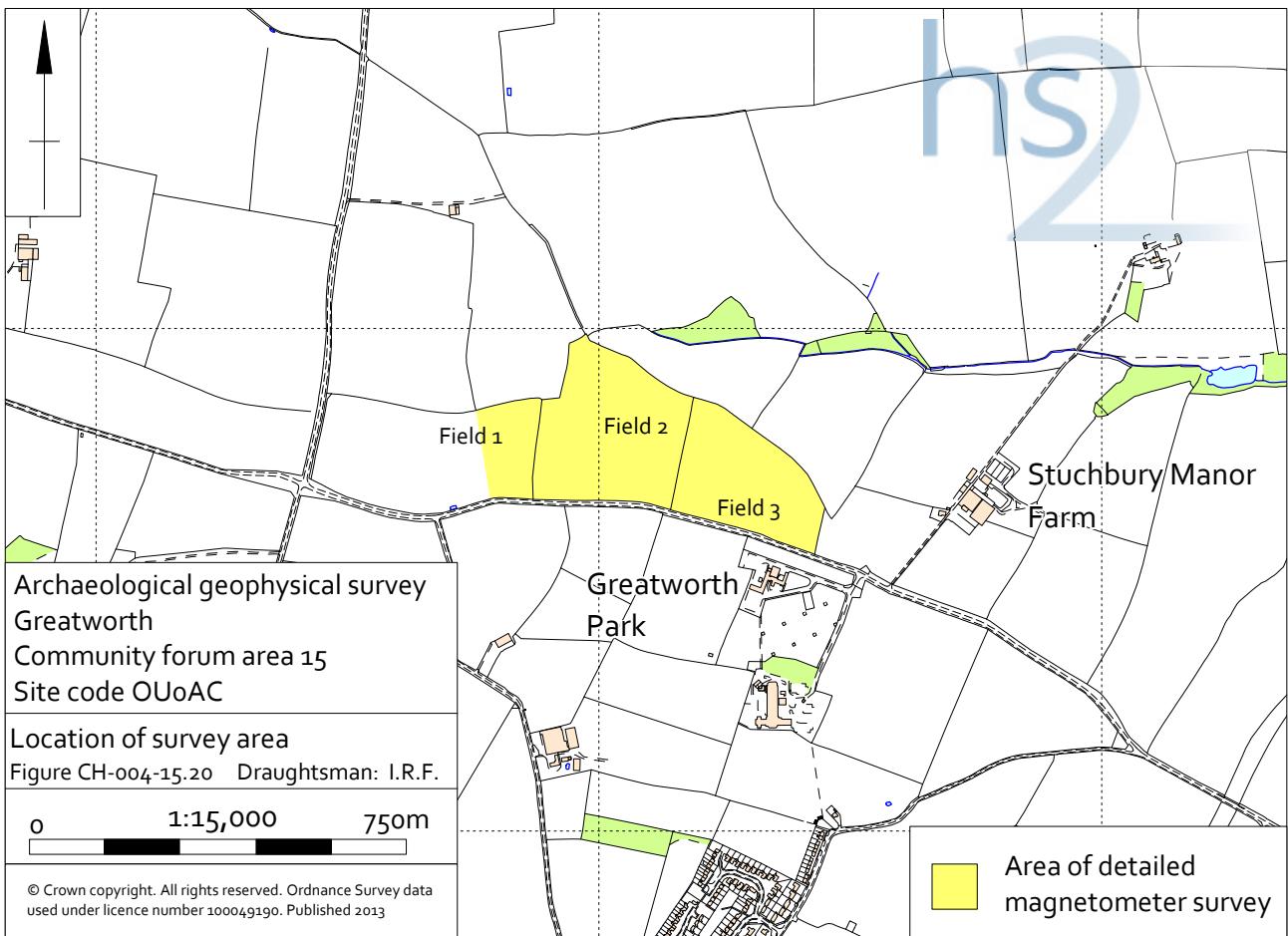
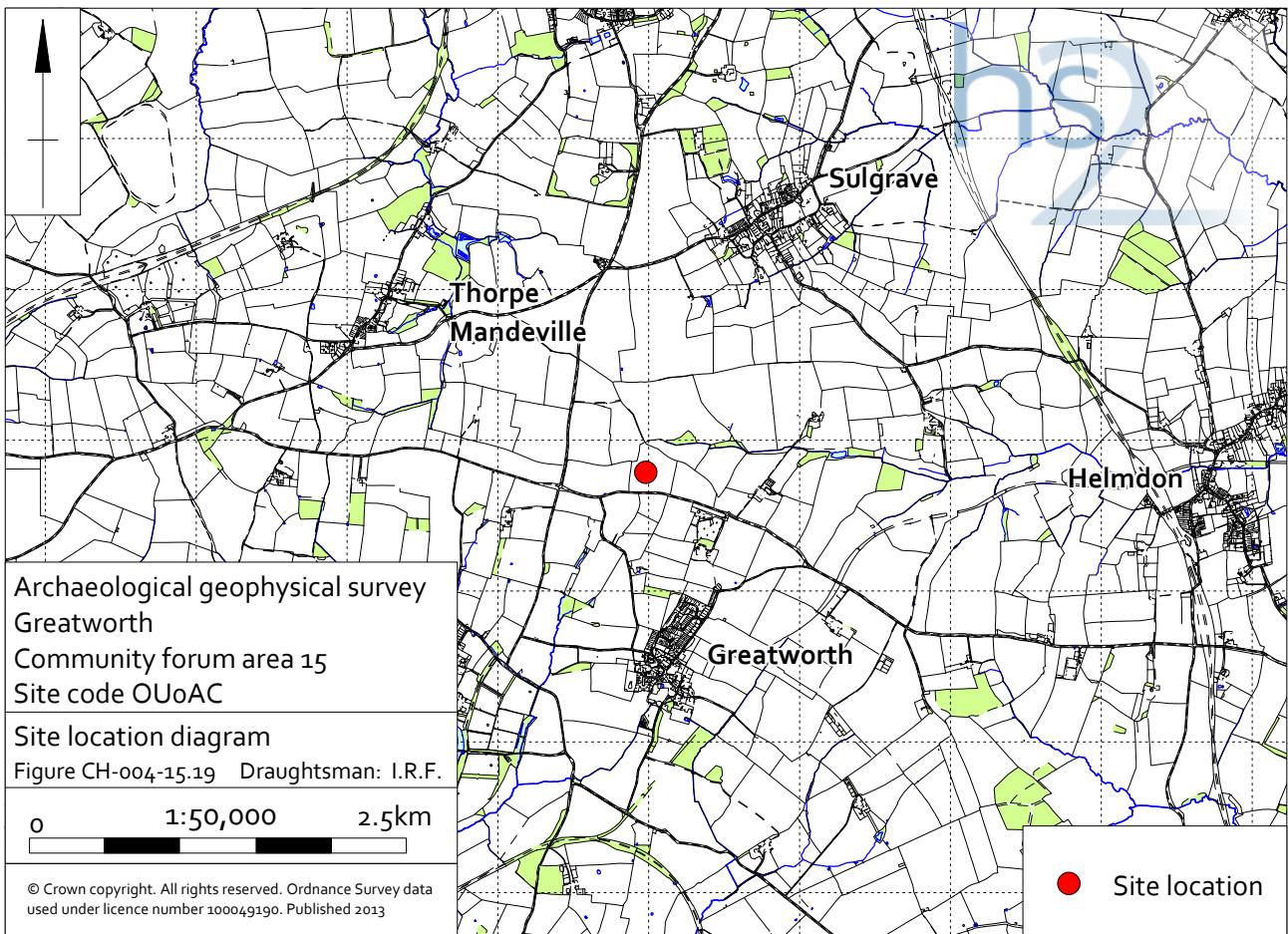

**Project:** G1317-3 HS2: C252 Country South  
CFA15 Greatworth

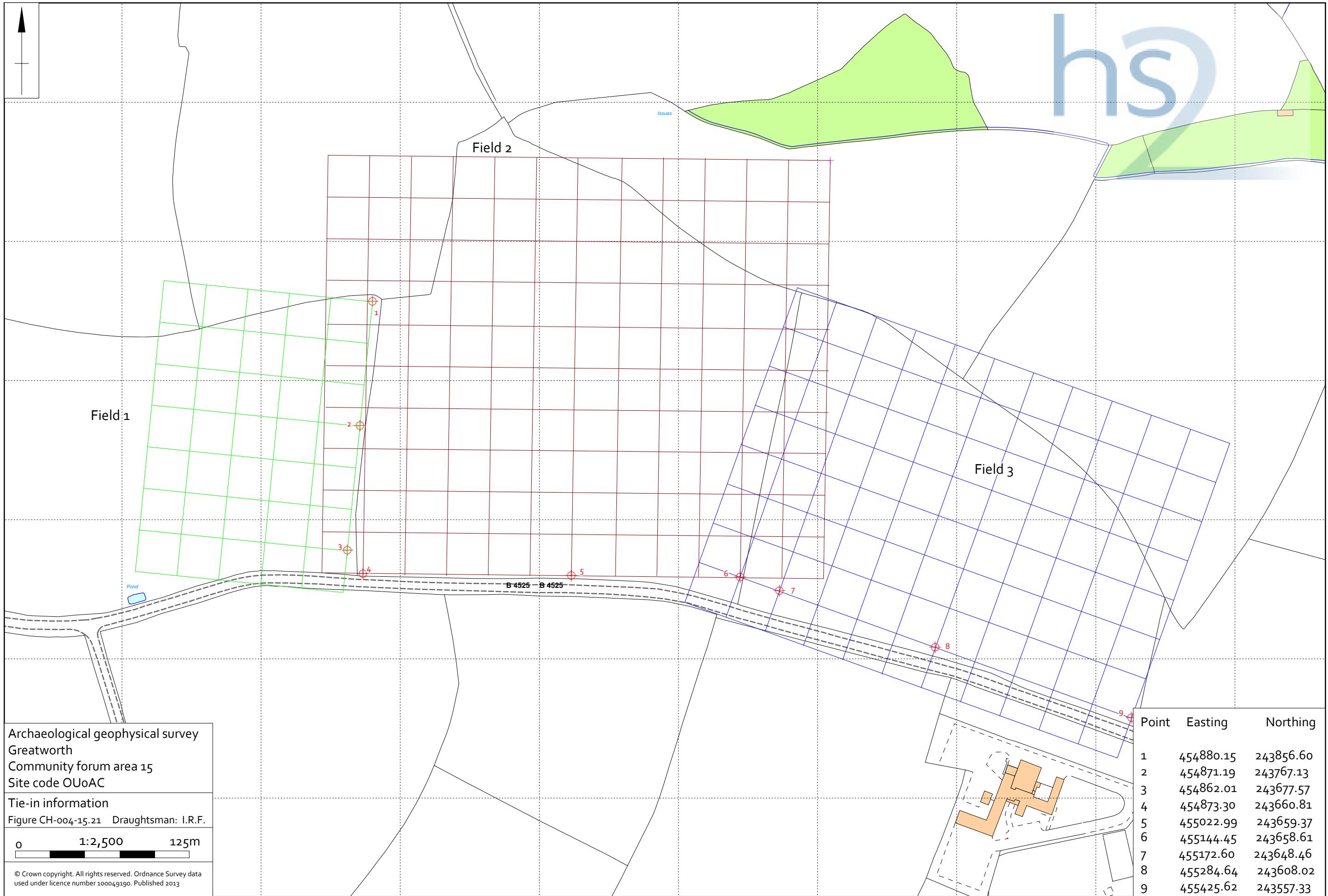
**Title:** OU0AB: Tie-in Information

Based on the Ordnance Survey Map provided by the client. Reproduced with the permission of the Controller of HMSO © Crown Copyright (AL100018665)

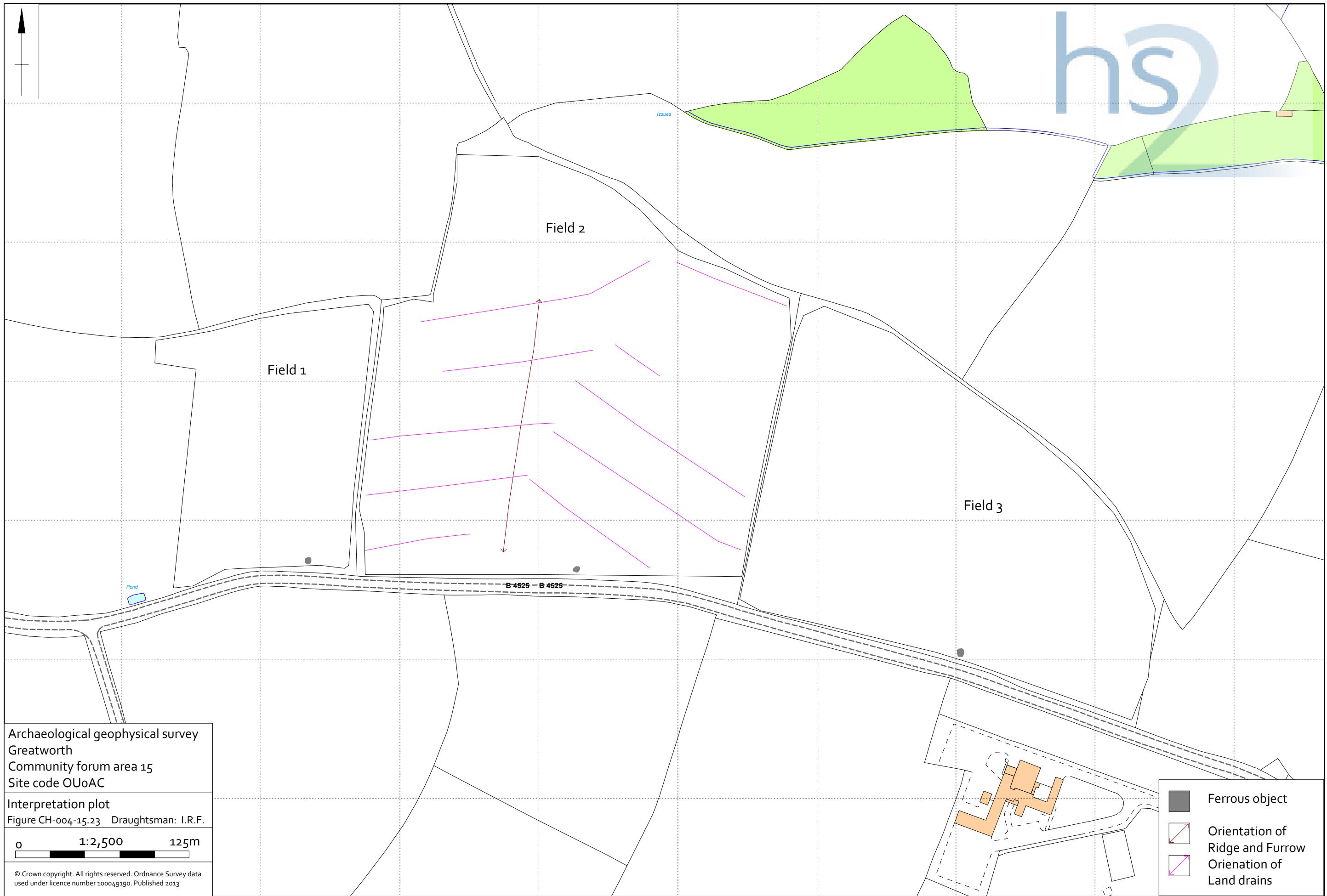
Drawn by: EWood

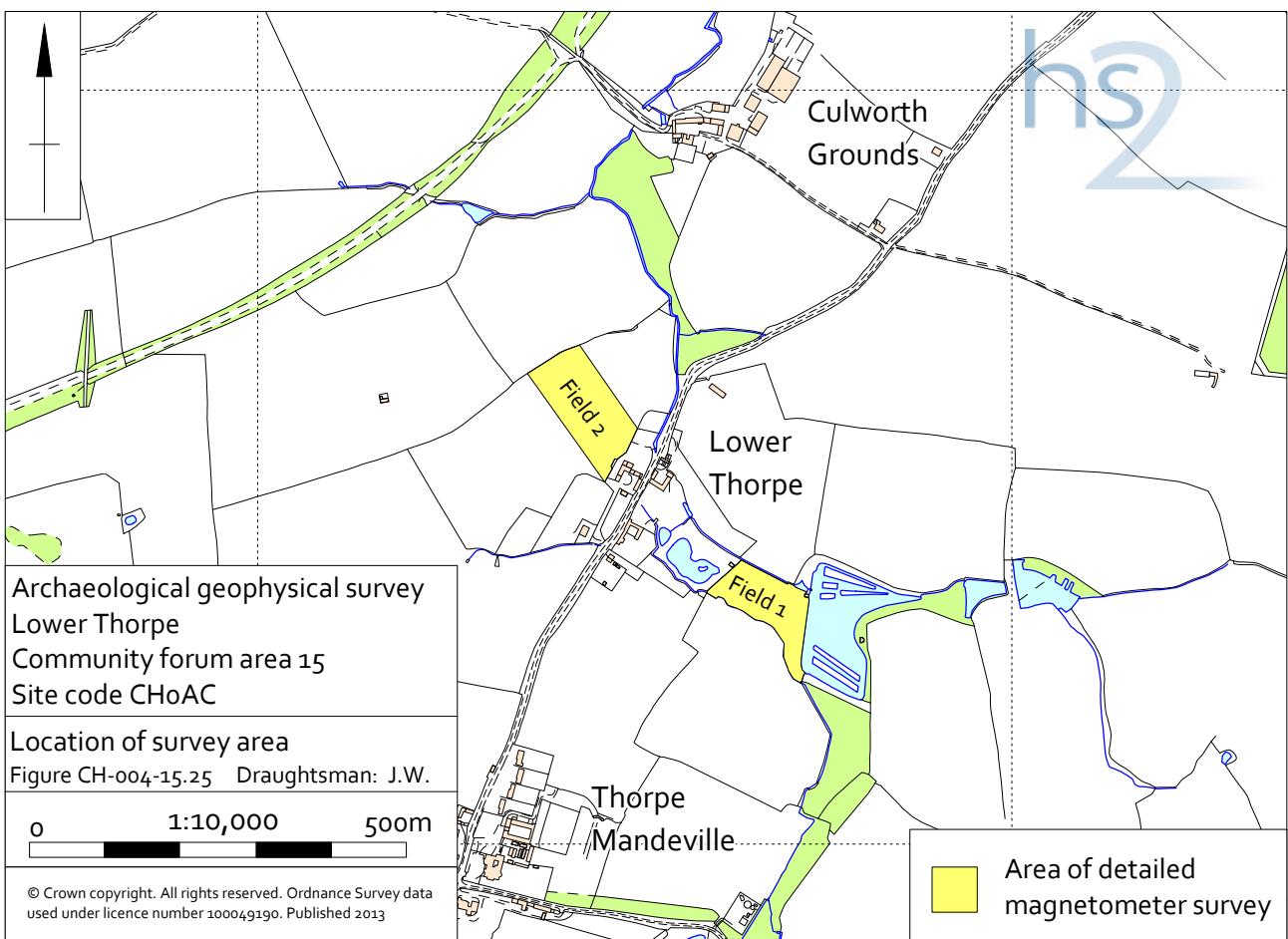
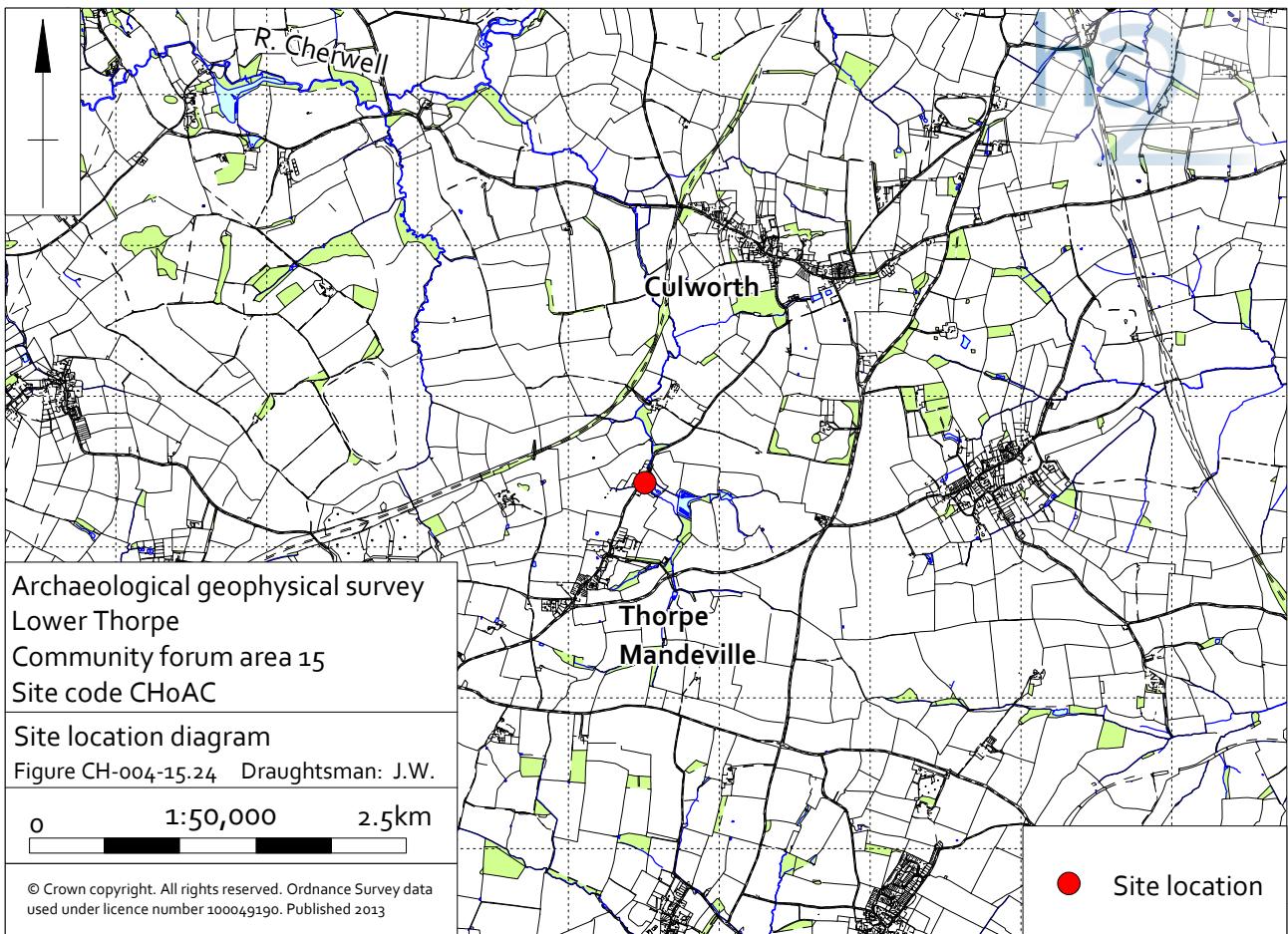
CH-004-15.18

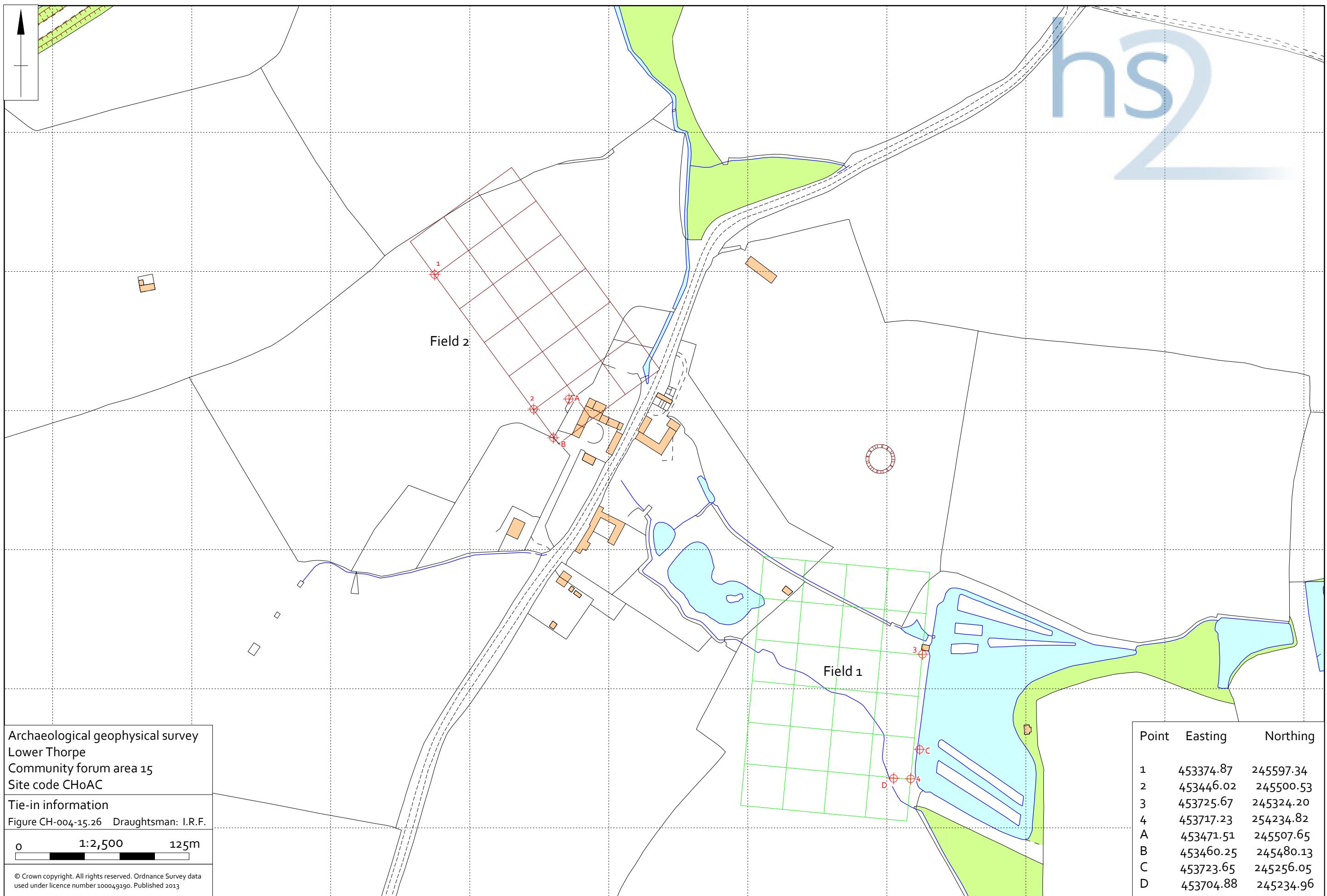


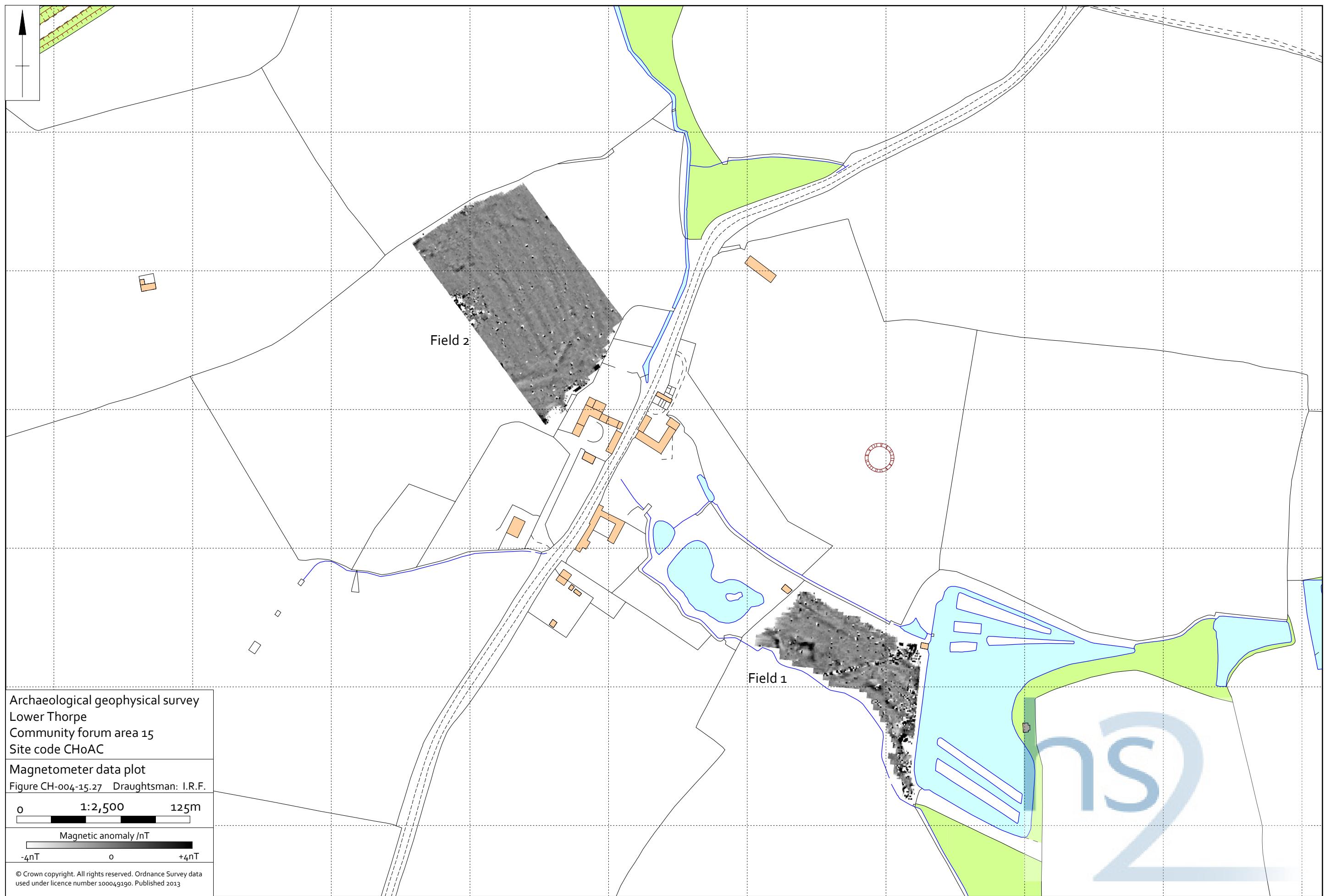




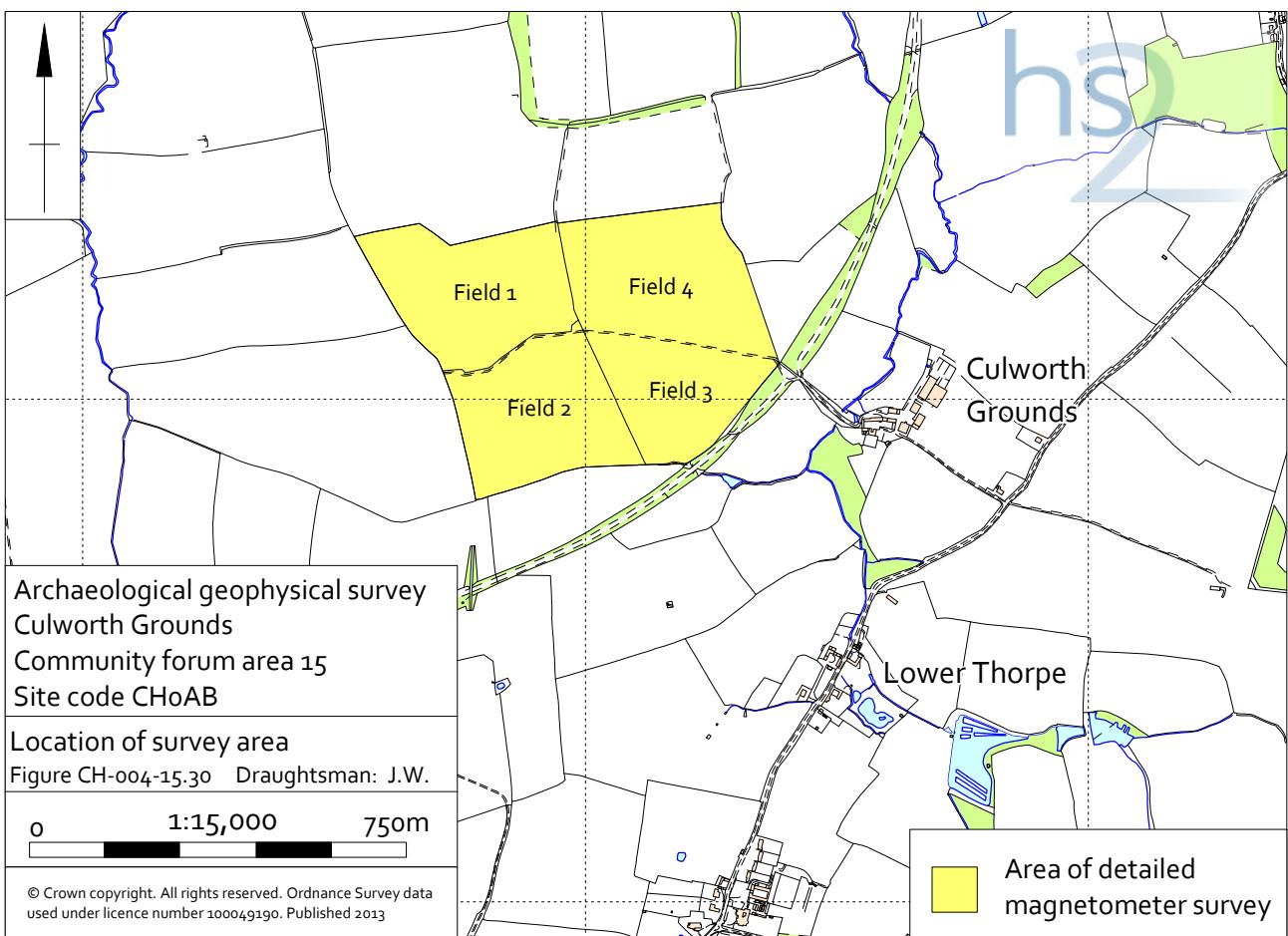
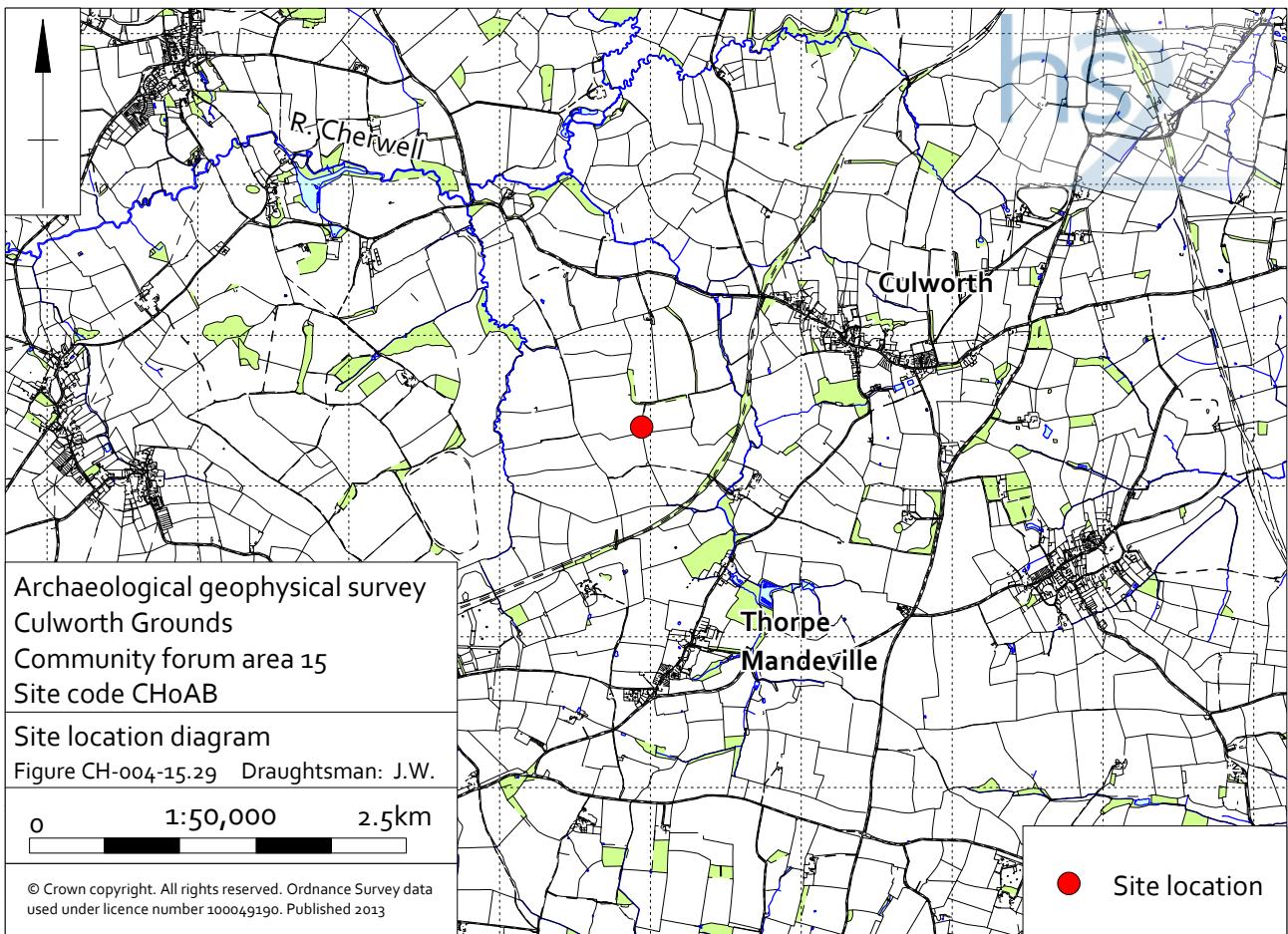


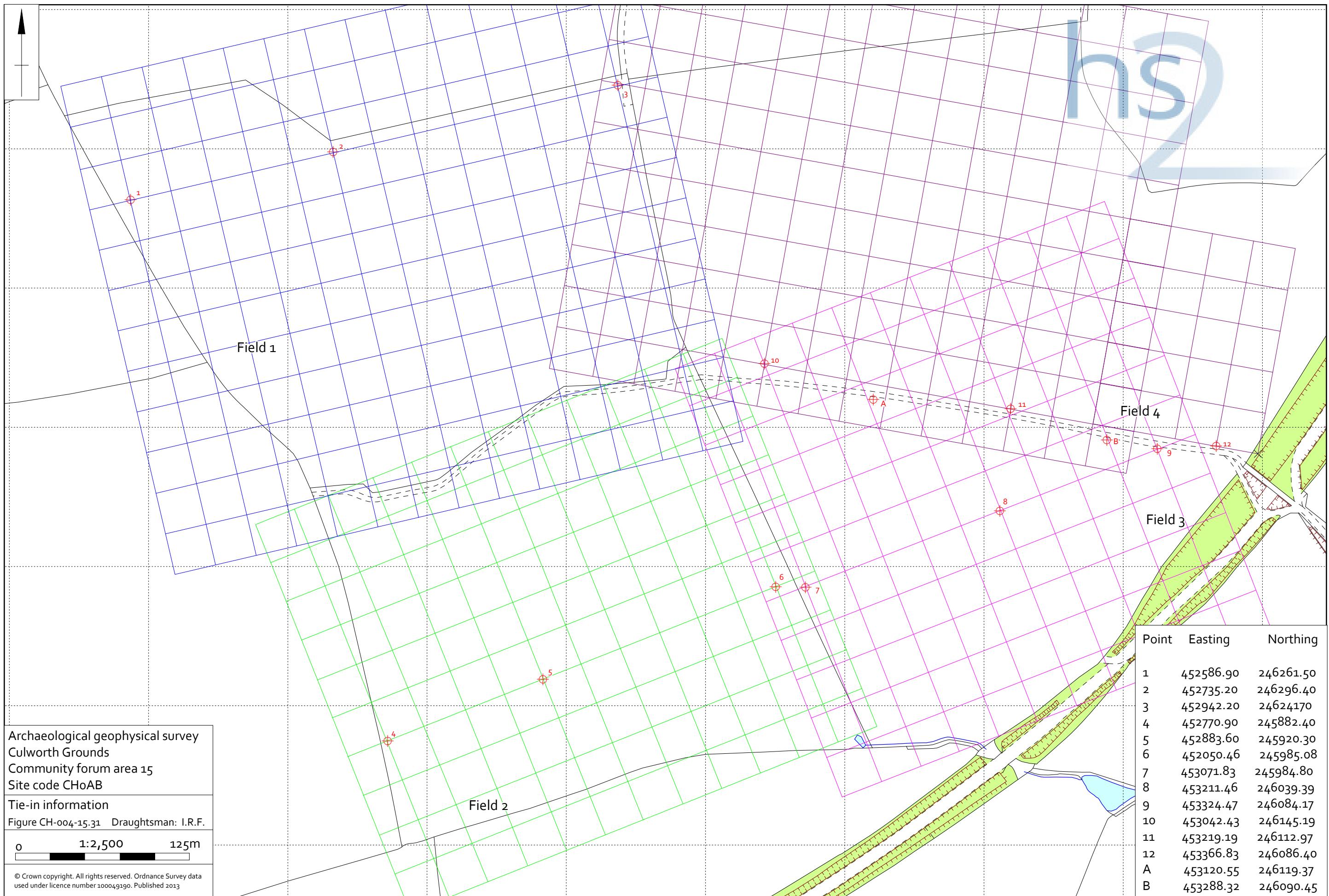




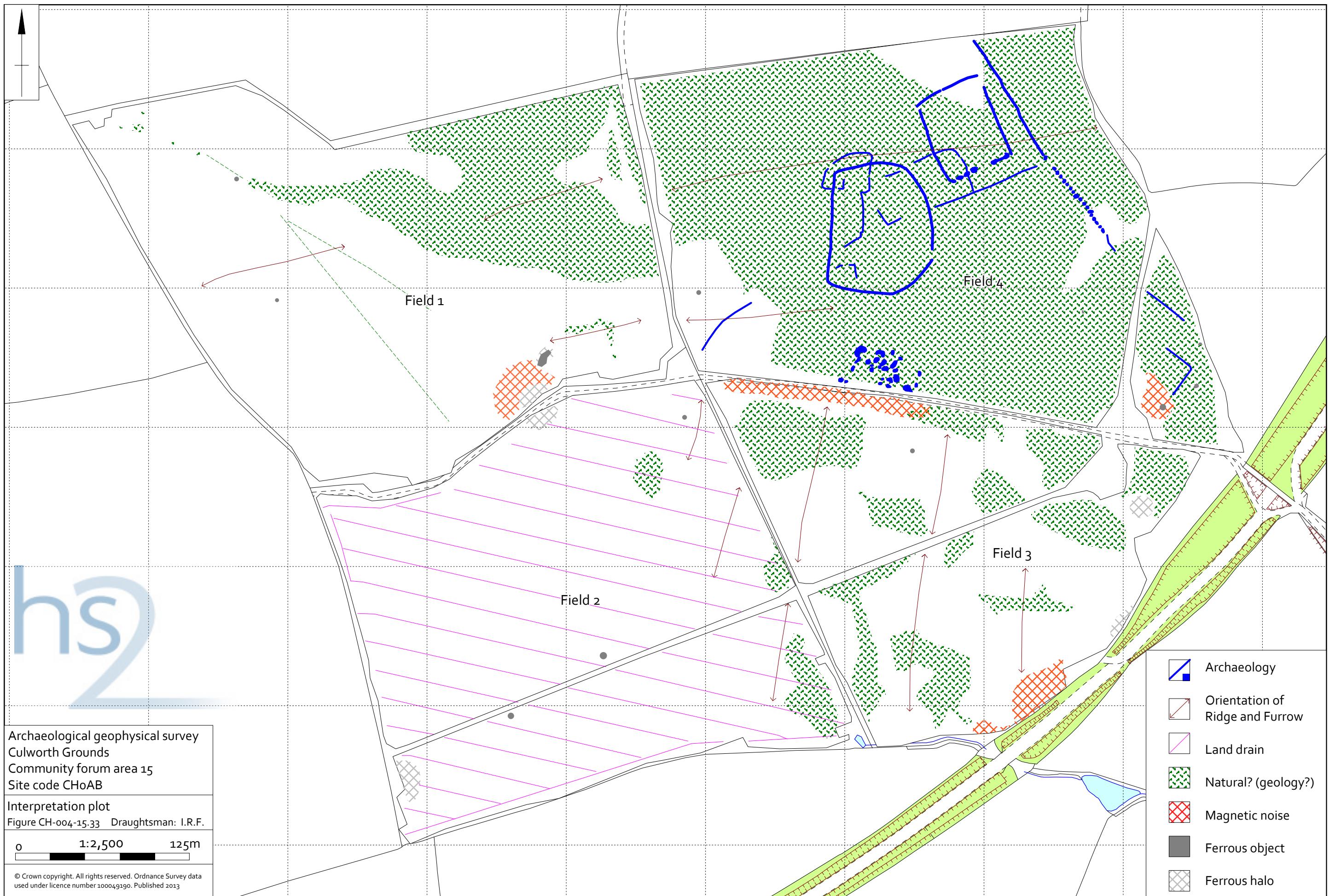


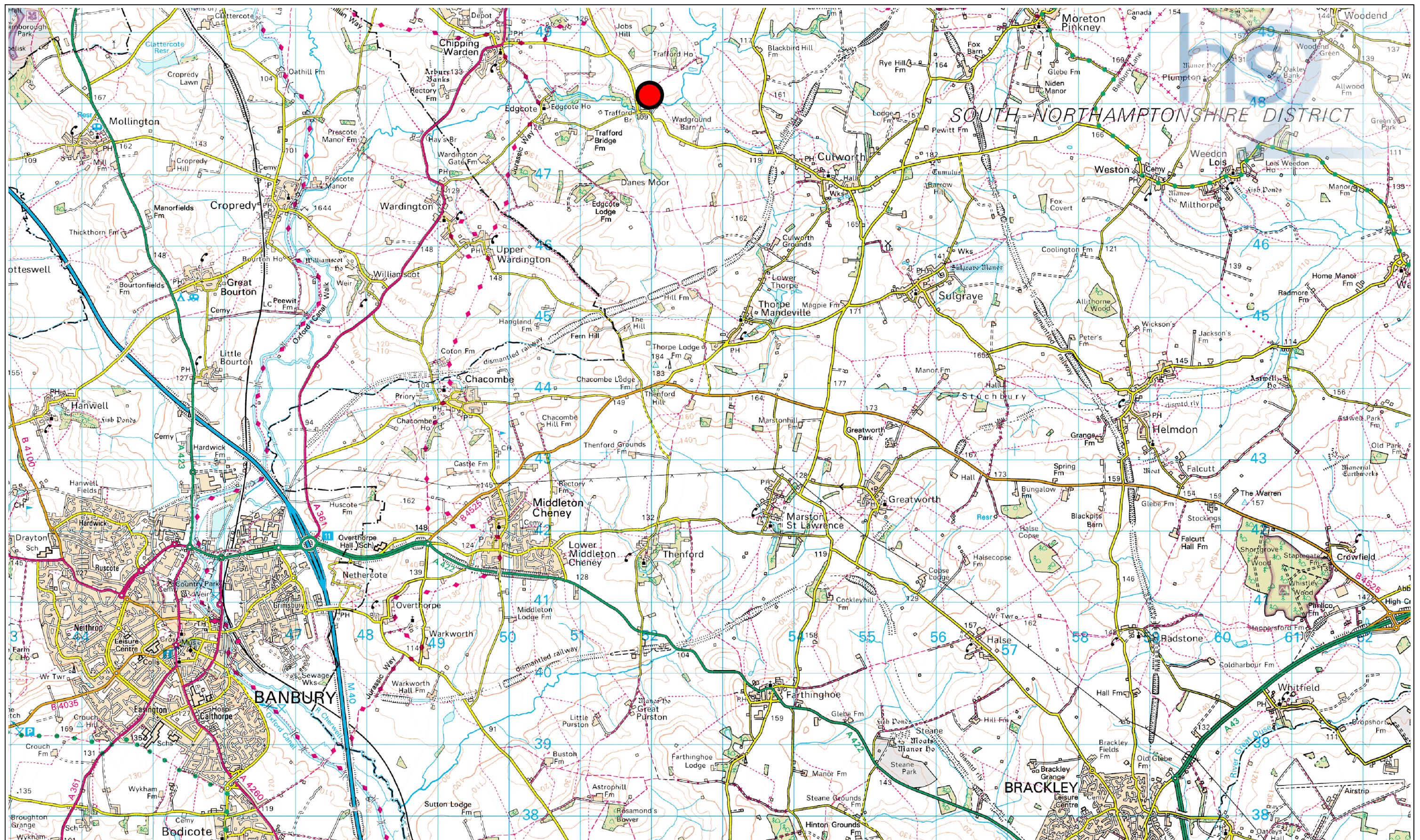












**GSB**

PROSPECTION Ltd

GSB Prospection Ltd  
Cowburn Farm, 21 Market Street  
Thornton, Bradford, BD13 3HW

+44 (0)1274 835016



1:50000 @ A3



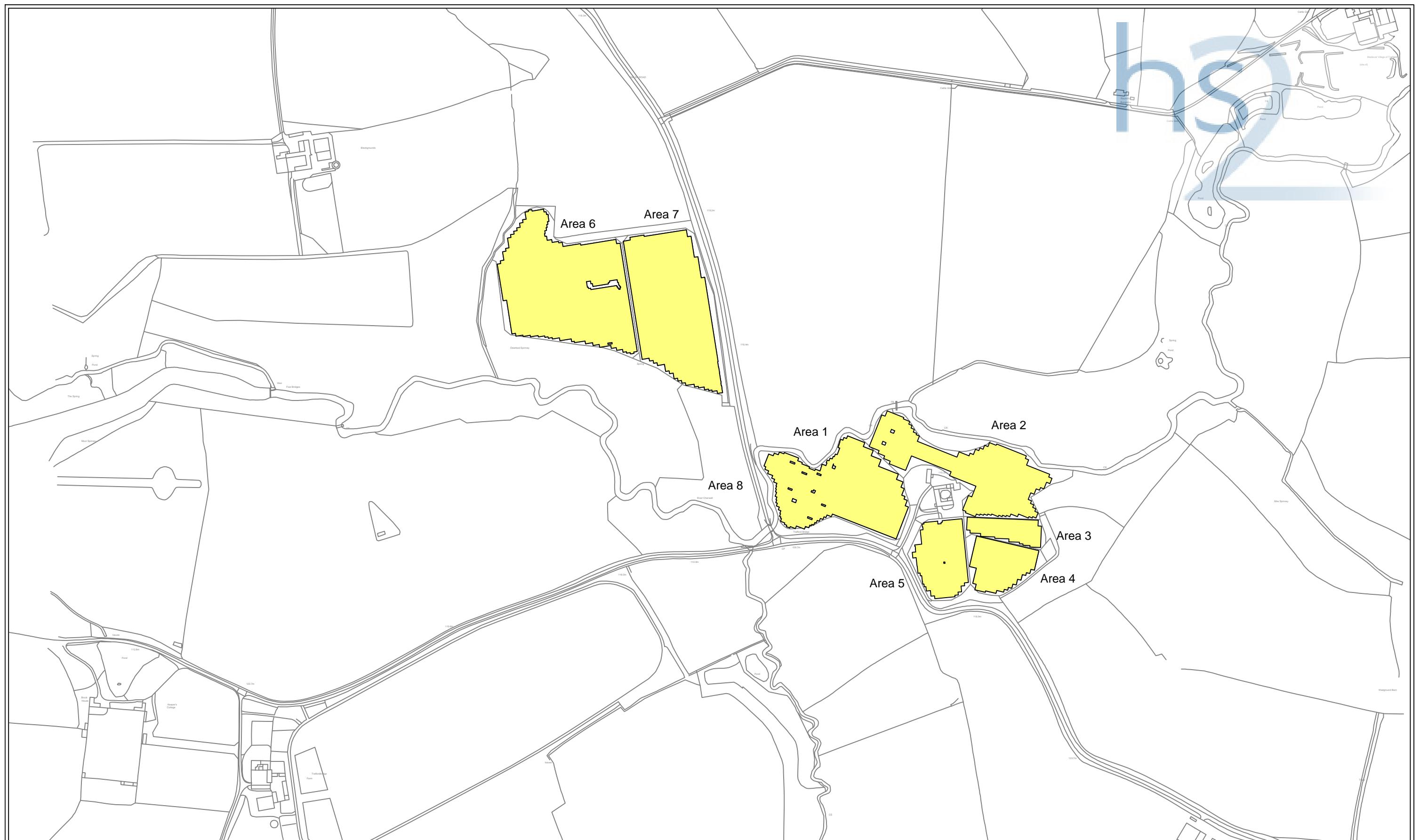
**Project:** G1317/7 HS2: C252 Country South  
CFA15 Trafford Bridge CW0AA

**Title:** CW0AA: Site Location Diagram

Based on the Ordnance Survey Map provided by the client. Reproduced with the permission of the Controller of HMSO © Crown Copyright (AL100018665)

Drawn by: JMT

CH-004-15.34



GSB

## PROSPECTION Ltd

GSB Prospection Ltd  
Rowburn Farm, 21 Market Street  
Wetherby, West Yorkshire, BD16 2LW

hornton, Bradford, BD13  
+44 (0)1274 835016



0 metres 200

1:5000 @ A3

### Area of Detailed Magnetometer Survey

**Project:** G1317/7 HS2: C252 Country South  
CFA15 Trafford Bridge CWoAA

**Title:** CW0AA: Location of Survey Areas

Based on the Ordnance Survey Map provided by the client. Reproduced with the permission of the Controller of HMSO © Crown Copyright (AL100018665)

Drawn by: GA

CH-004-15.35

hs2

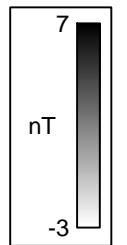
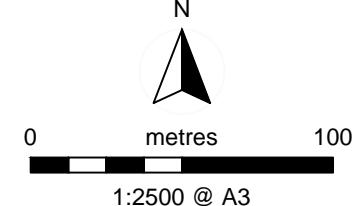


**GSB**

PROSPECTION Ltd

GSB Prospection Ltd  
Cowburn Farm, 21 Market Street  
Thornton, Bradford, BD13 3HW

+44 (0)1274 835016



**Project:** G1317/7 HS2: C252 Country South  
CFA15 Trafford Bridge CWoAA

**Title:** CWoAA: Magnetometer Survey -  
Greyscale Plot

Based on the Ordnance Survey Map provided by the client. Reproduced with  
the permission of the Controller of HMSO © Crown Copyright (AL100018665)

Drawn by: GA

CH-004-15.36

hs2

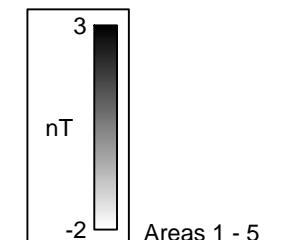
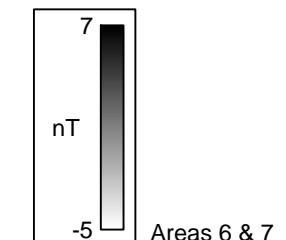
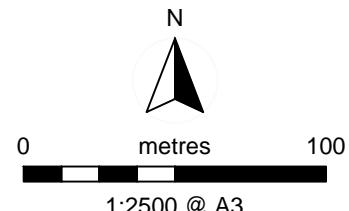


**GSB**

PROSPECTION Ltd

GSB Prospection Ltd  
Cowburn Farm, 21 Market Street  
Thornton, Bradford, BD13 3HW

+44 (0)1274 835016



**Project:** G1317/7 HS2: C252 Country South  
CFA15 Trafford Bridge CWoAA

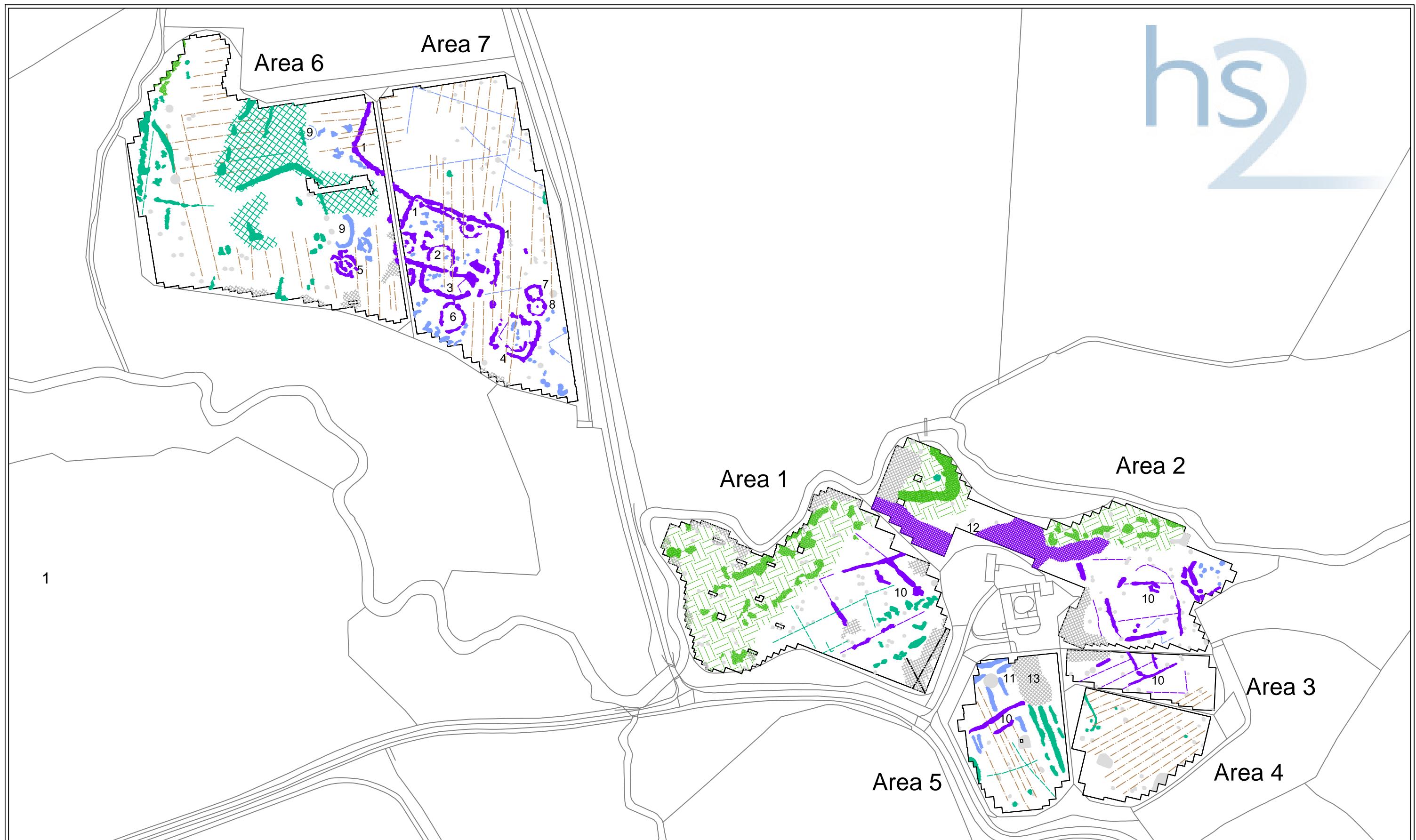
**Title:** CWoAA: Magnetometer Survey -  
Greyscale Plot

Based on the Ordnance Survey Map provided by the client. Reproduced with  
the permission of the Controller of HMSO © Crown Copyright (AL100018665)

Drawn by: GA

CH-004-15.37

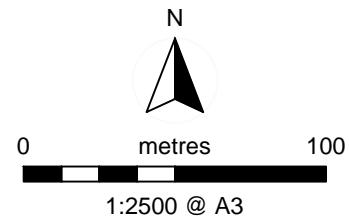
hs2



**GSB**  
PROSPECTION Ltd

GSB Prospection Ltd  
Cowburn Farm, 21 Market Street  
Thornton, Bradford, BD13 3HW  
+44 (0)1274 835016

**SUMO**



|  |   |  |   |
|--|---|--|---|
|  | Archaeology<br>(discrete anomaly / zone / trend)          |  | Natural<br>(discrete anomaly / zone)        |
|  | Possible Archaeology<br>(discrete anomaly / zone / trend) |  | Agricultural<br>(Ridge and Furrow)          |
|  | Uncertain Origin<br>(discrete anomaly / zone / trend)     |  | Ferrous<br>(discrete anomaly / zone / Pipe) |

**Project:** G1317/7 HS2: C252 Country South  
CFA15 Trafford Bridge CWoAA

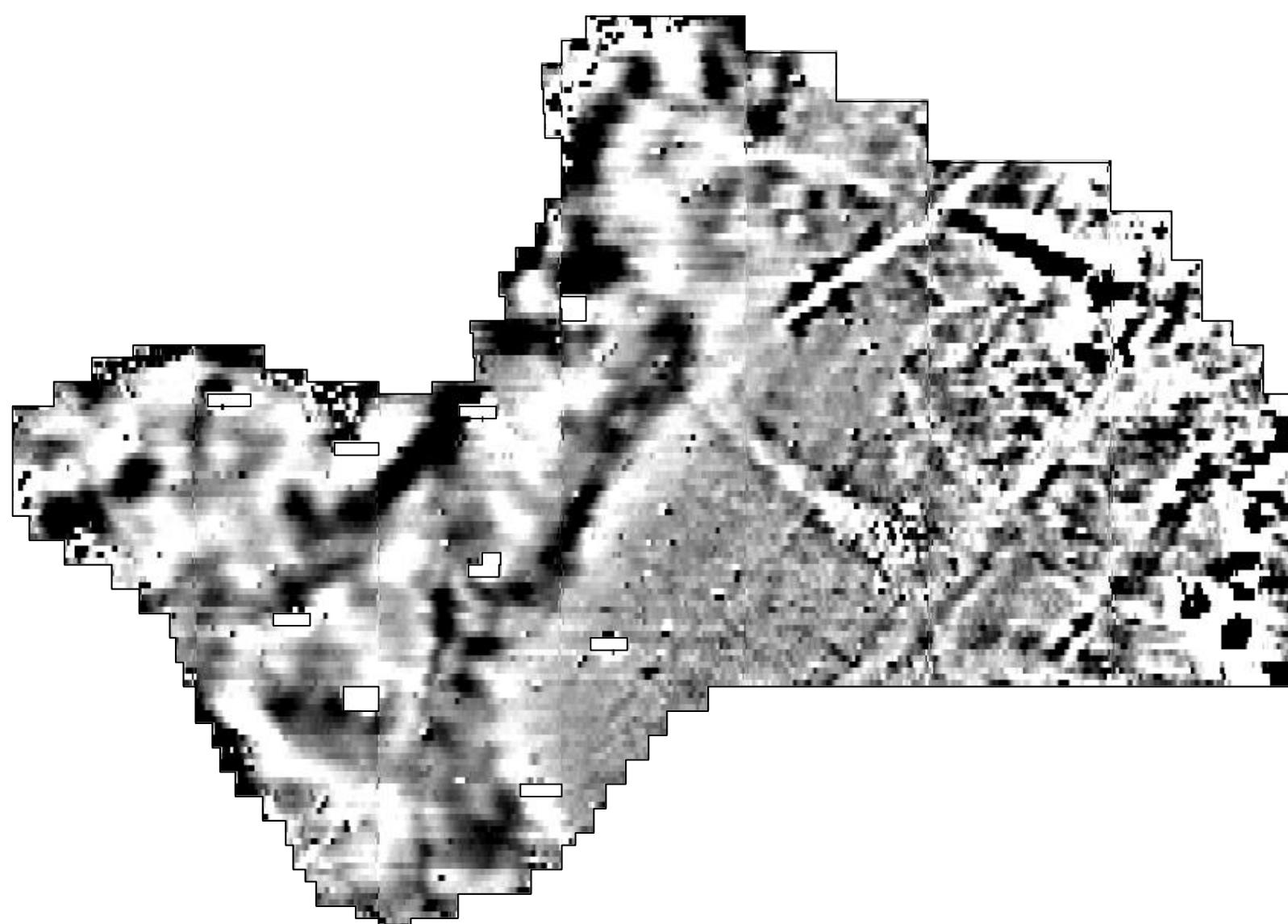
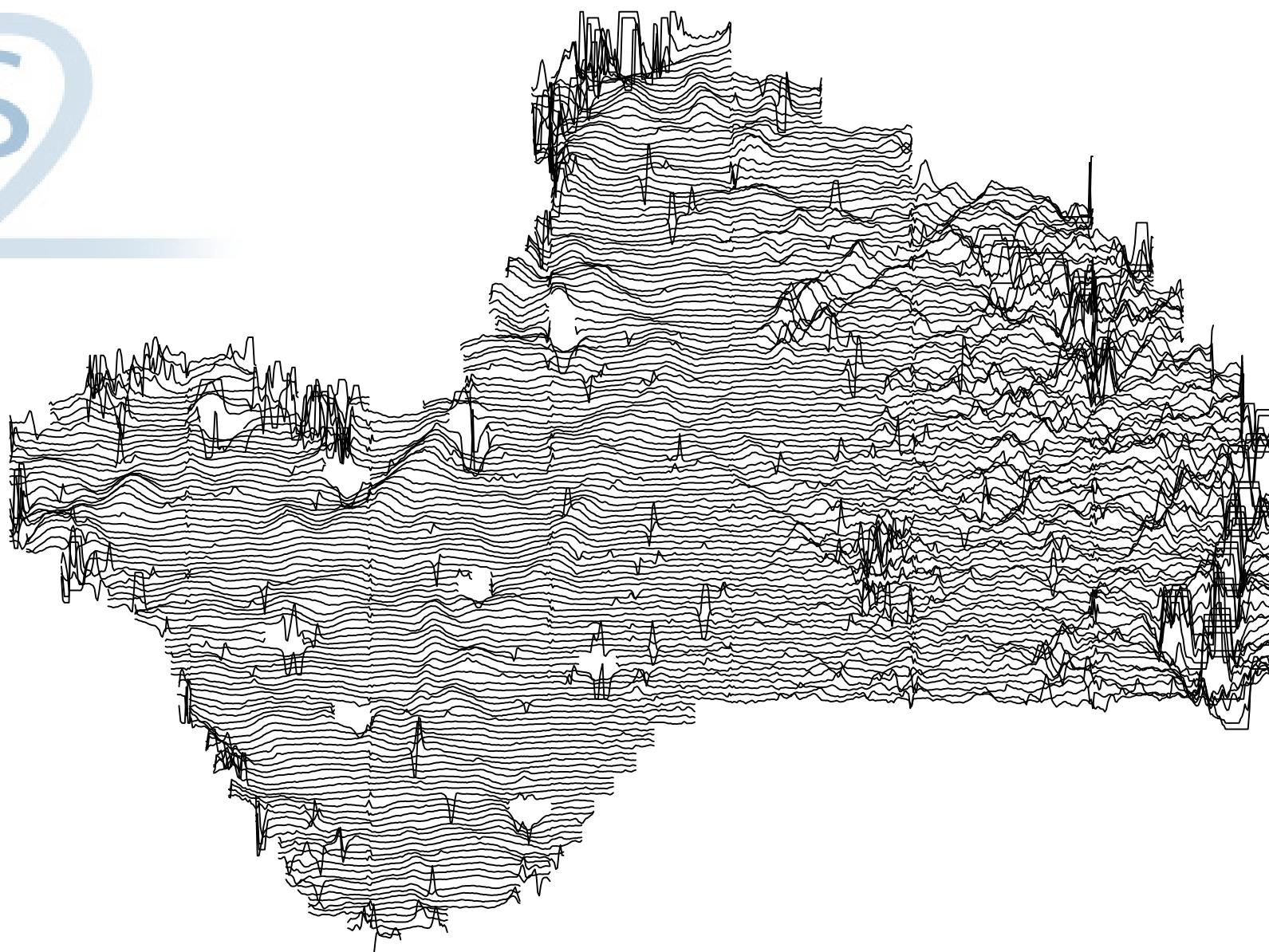
**Title:** CWoAA: Magnetometer Survey -  
Interpretation

Based on the Ordnance Survey Map provided by the client. Reproduced with  
the permission of the Controller of HMSO © Crown Copyright (AL100018665)

Drawn by: GA

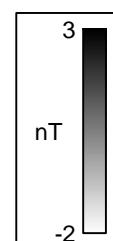
CH-004-15.38

hs2



N  
metres  
0 40  
1:1000 @ A3

15 nT  
Y axis plot scale: 15nT/cm  
Clip levels: +/-15nT



GSB Prospection Ltd  
Cowburn Farm, 21 Market Street  
Thornton  
Bradford  
BD13 3HW  
+44 (0)1274 835016

Project: G1317/7 HS2: C252 Country South  
CFA15 Trafford Bridge CW0AA

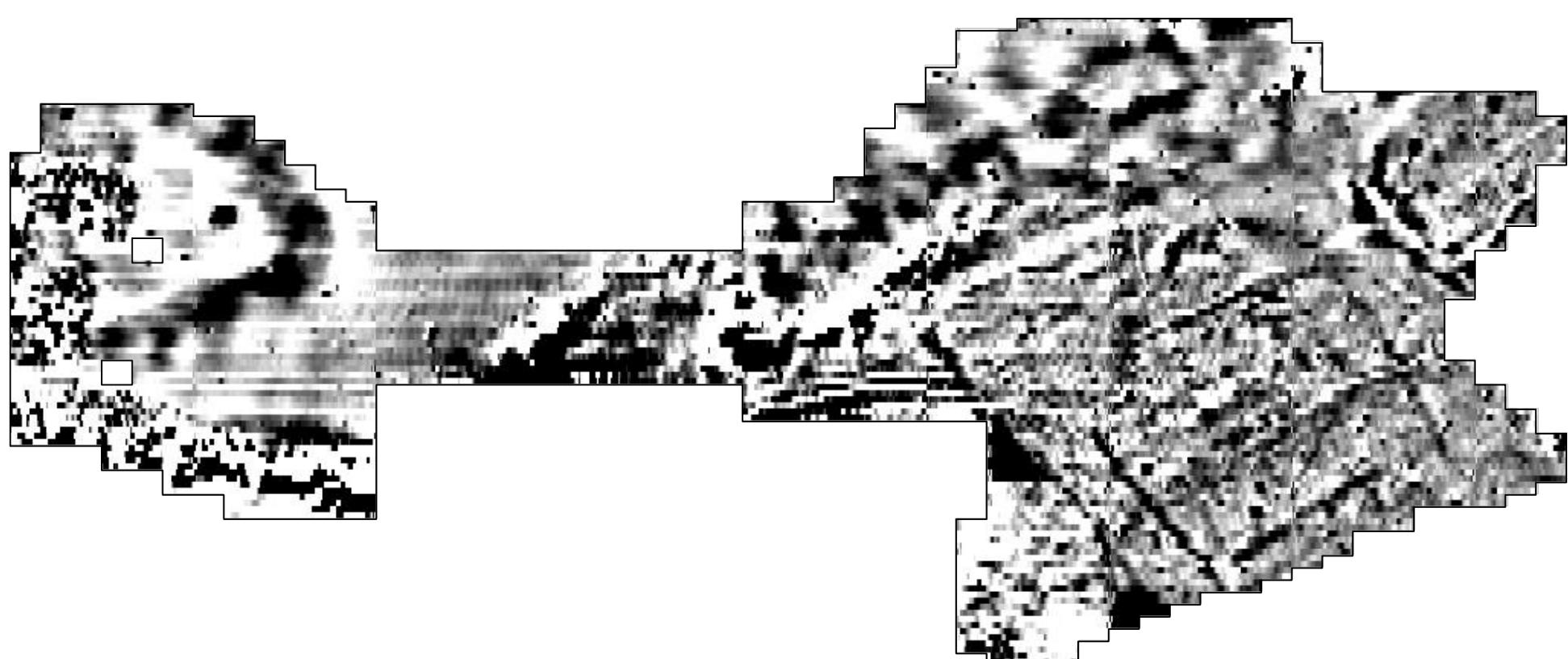
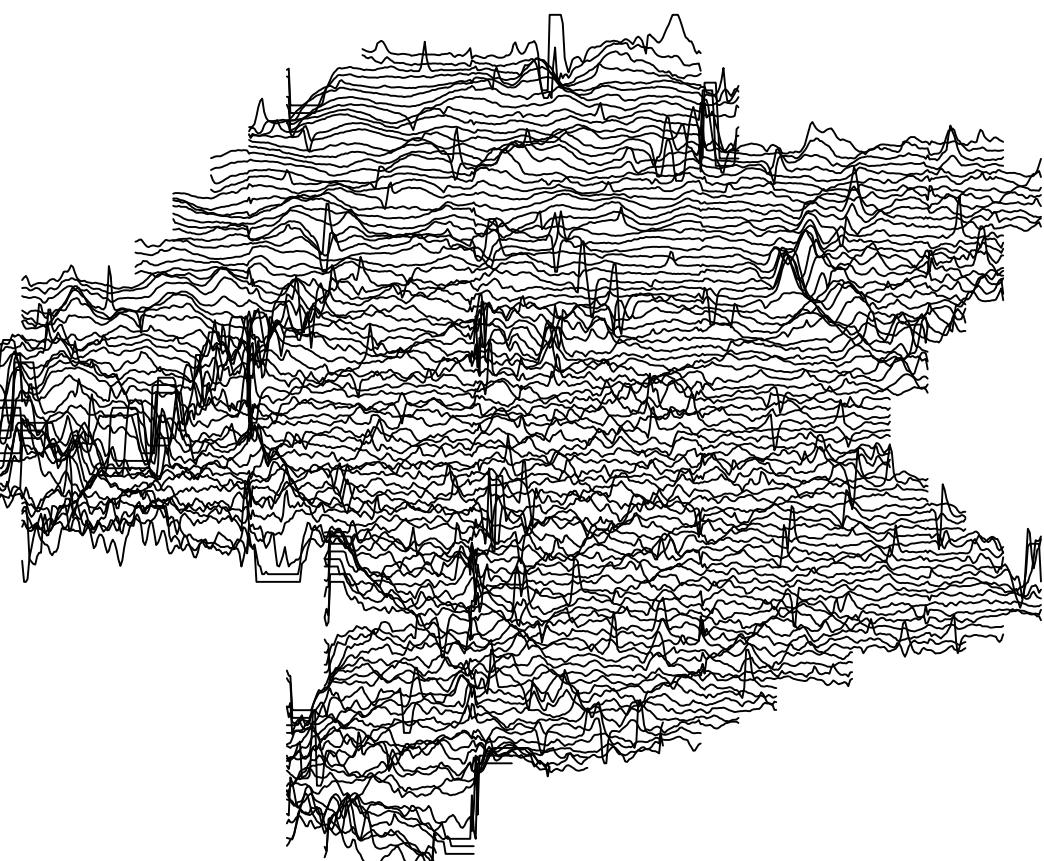
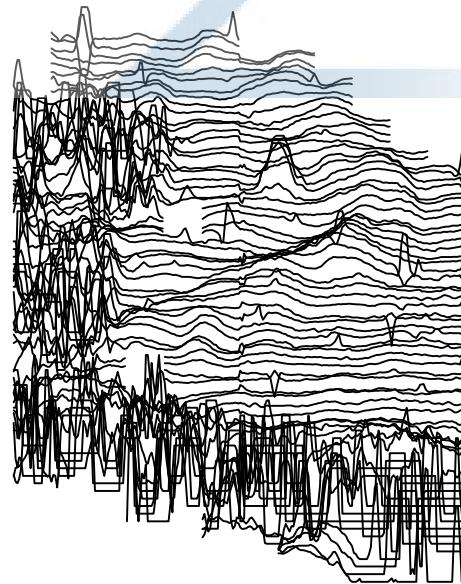
Title: CW0AA: Magnetic Data - Area 1:  
XY Trace Plot & Greyscale Plot

Drawn by: ELWood

**GSB**  
PROSPECTION Ltd  
sumo

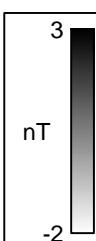
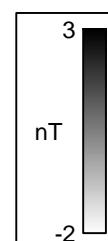
CH-004-15.39

hs



N  
metres  
0 40  
1:1000 @ A3

15 nT  
Y axis plot scale: 15nT/cm  
Clip levels: +/-15nT



GSB Prospection Ltd  
Cowburn Farm, 21 Market Street  
Thornton  
Bradford  
BD13 3HW  
+44 (0)1274 835016

**GSB**  
PROSPECTION Ltd  
SUMO

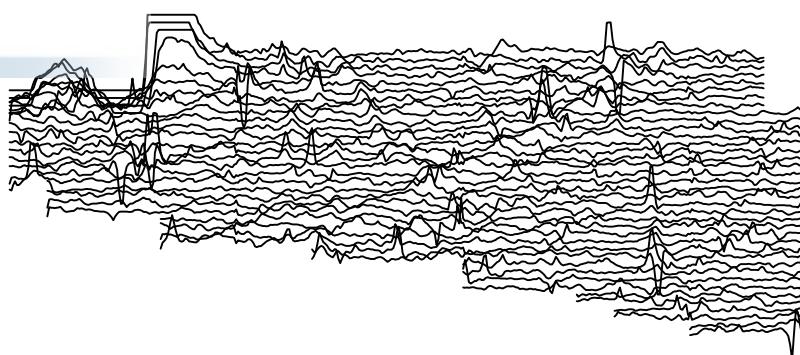
**Project:** G1317/7 HS2: C252 Country South  
CFA15 Trafford Bridge CW0AA

**Title:** CW0AA: Magnetic Data - Area 2:  
XY Trace Plot & Greyscale Plot

Drawn by: ELWood

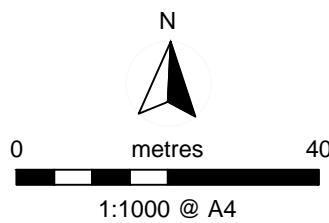
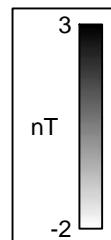
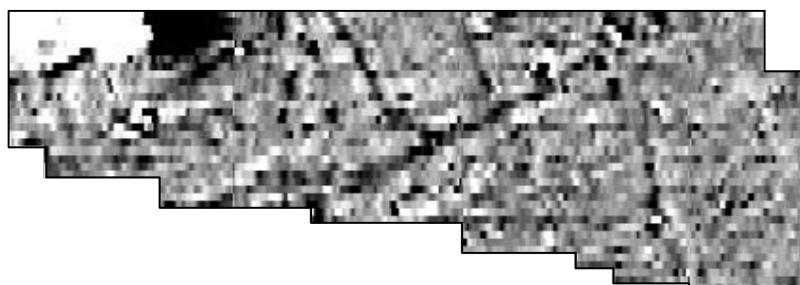
**CH-004-15.40**

hs2



15 nT

Y axis plot scale: 15nT/cm  
Clip levels: +/-15nT



GSB Prospection Ltd  
Cowburn Farm, 21 Market Street  
Thornton  
Bradford  
BD13 3HW  
+44 (0)1274 835016

**GSB**  
PROSPECTION Ltd  
**sumo**

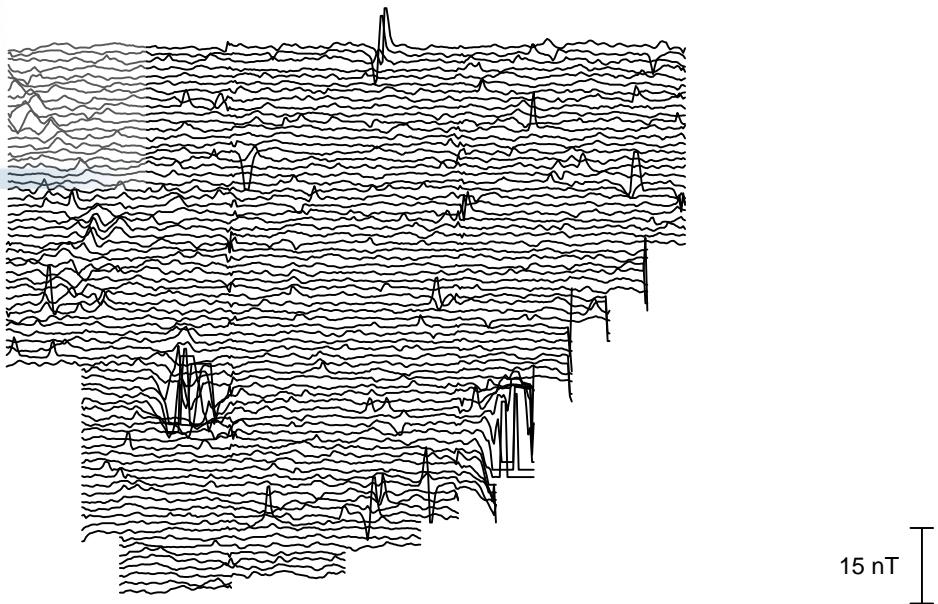
**Project:** G1317/7 HS2: C252 Country South  
CFA15 Trafford Bridge CW0AA

**Title:** CW0AA: Magnetic Data - Area 3:  
XY Trace Plot & Greyscale Plot

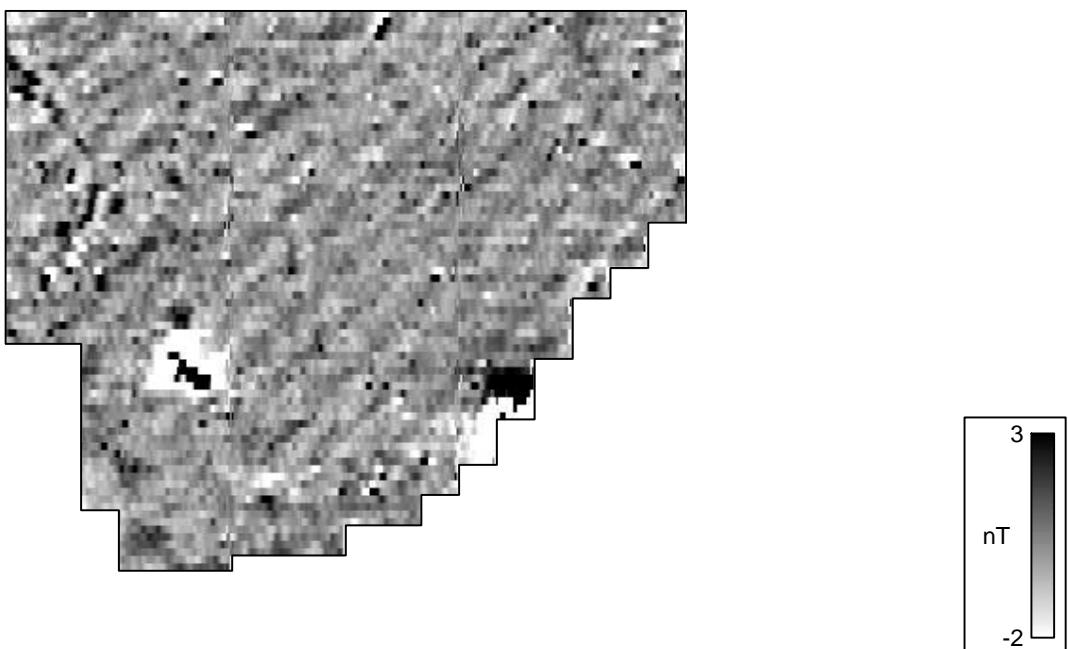
Drawn by: ELWood

**CH-004-15.41**

hs2



Y axis plot scale: 15nT/cm  
Clip levels: +/-15nT



N  
metres  
0 40  
1:1000 @ A4

GSB Prospection Ltd  
Cowburn Farm, 21 Market Street  
Thornton  
Bradford  
BD13 3HW  
+44 (0)1274 835016

**GSB**  
PROSPECTION Ltd  
**sumo**

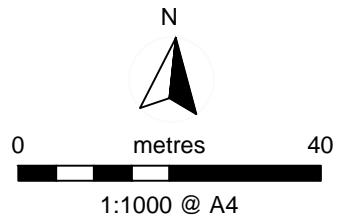
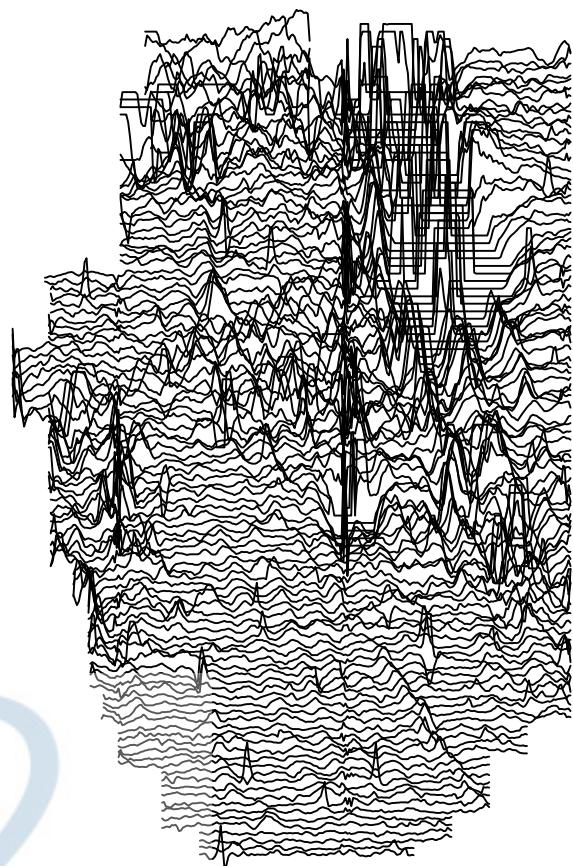
**Project:** G1317/7 HS2: C252 Country South  
CFA15 CW0AA Trafford Bridge

**Title:** CW0AA: Magnetic Data - Area 4:  
XY Trace Plot & Greyscale Plot

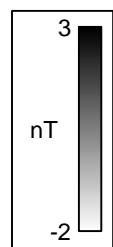
Drawn by: ELWood

CH-004-15.42

hs2



15 nT  
Y axis plot scale: 15nT/cm  
Clip levels: +/-15nT



GSB Prospection Ltd  
Cowburn Farm, 21 Market Street  
Thornton  
Bradford  
BD13 3HW  
+44 (0)1274 835016

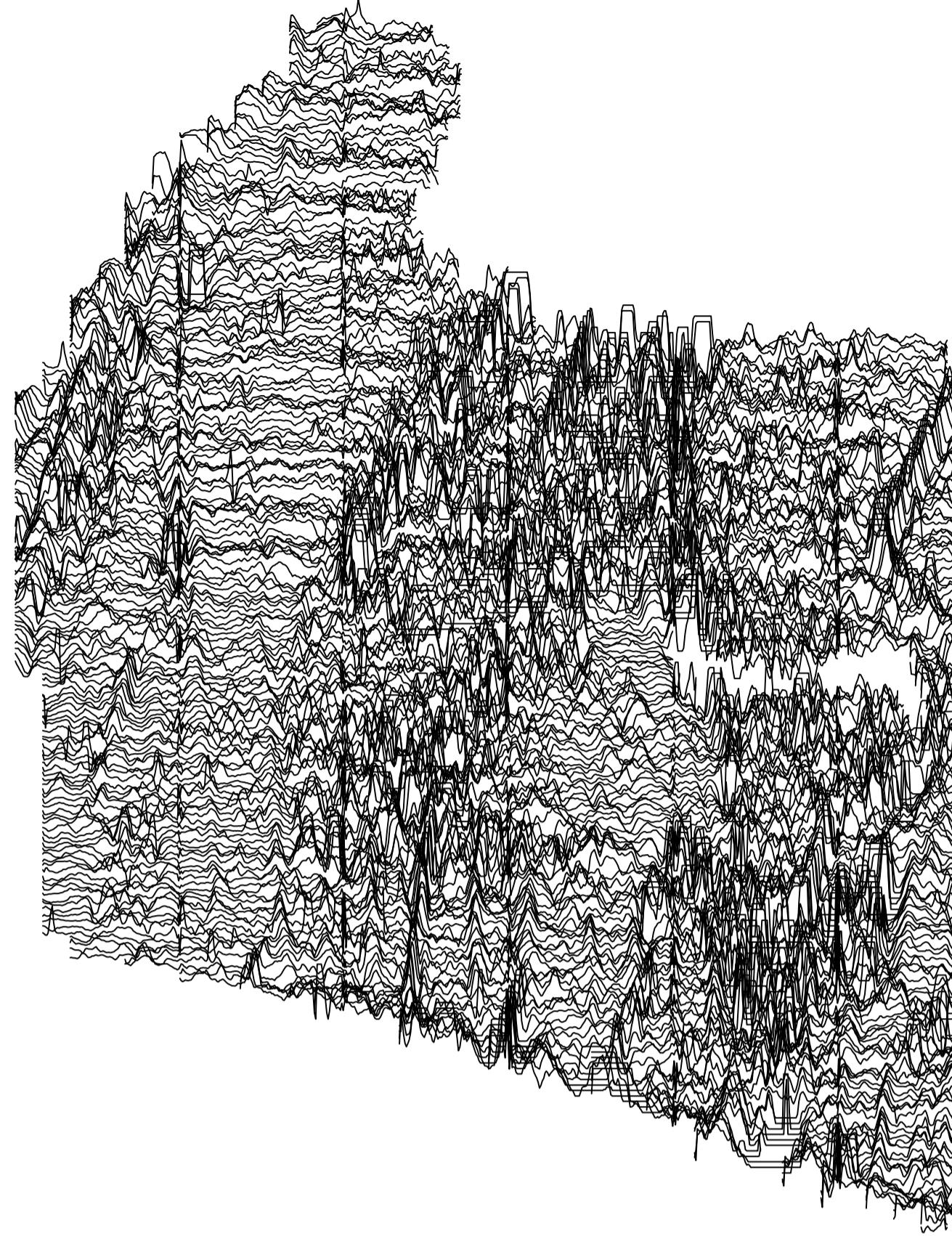
**GSB**  
PROSPECTION Ltd  
**SUMO**

**Project:** G1317/7 HS2: C252 Country South  
CFA15 CW0AA Trafford Bridge

**Title:** CW0AA: Magnetic Data - Area 5:  
XY Trace Plot & Greyscale Plot

Drawn by: ELWood

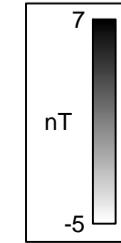
CH-004-15.43



N  
  
0 metres 40  
1:1000 @ A2

15 nT

Y axis plot scale: 15nT/cm  
Clip levels: +/-15nT



GSB Prospection Ltd  
Cowburn Farm, 21 Market Street  
Thornton  
Bradford  
BD13 3HW  
+44 (0)1274 835016

**Project:** G1317/7 HS2: C252 Country South  
CFA15 Trafford Bridge CW0AA

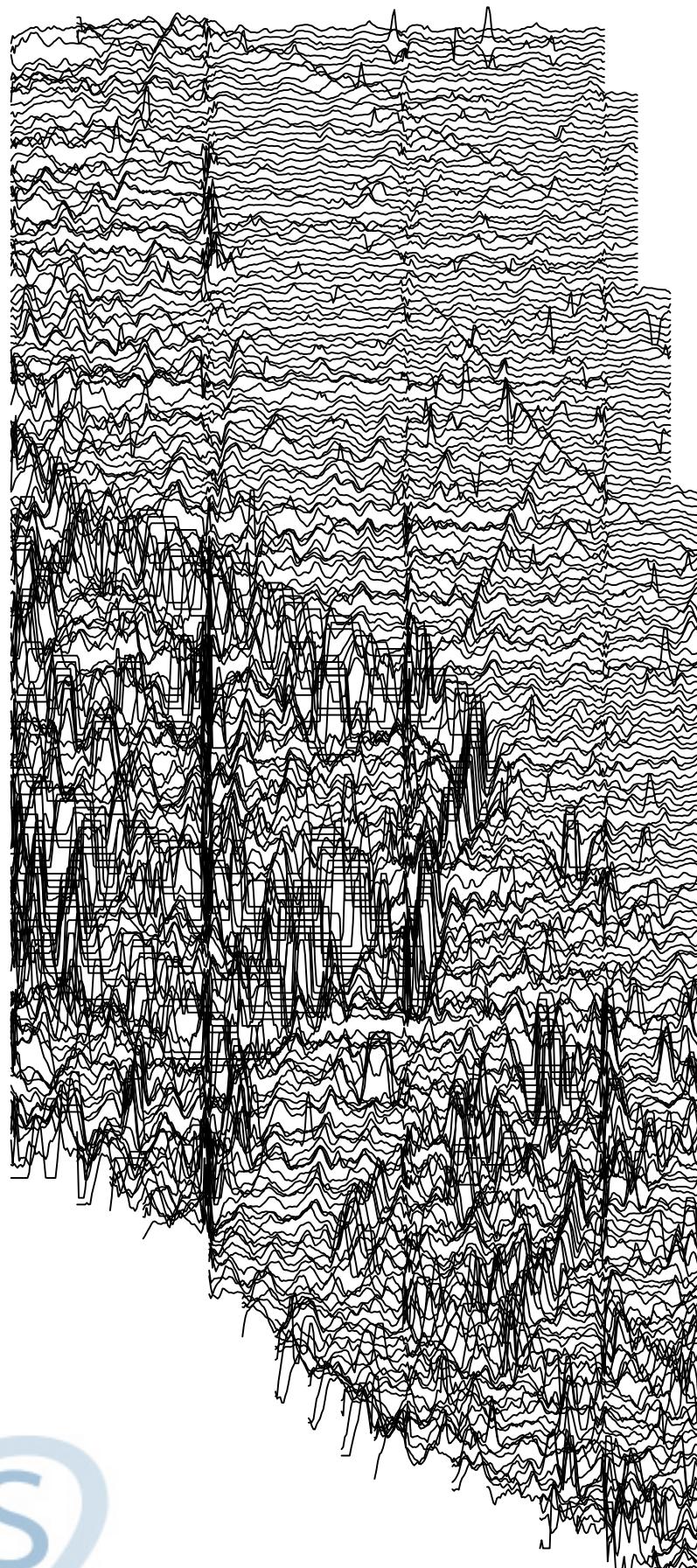
**Title:** CW0AA: Magnetic Data - Area 6:  
XY Trace Plot & Greyscale Plot

Drawn by: ELWood

**GSB**  
PROSPECTION Ltd  


CH-004-15.44

hs2



N  
0 metres 40  
1:1000 @ A3

15 nT

Y axis plot scale: 15nT/cm  
Clip levels: +/-15nT



GSB Prospection Ltd  
Cowburn Farm, 21 Market Street  
Thornton  
Bradford  
BD13 3HW  
+44 (0)1274 835016

**GSB**  
PROSPECTION Ltd  
**sumo**

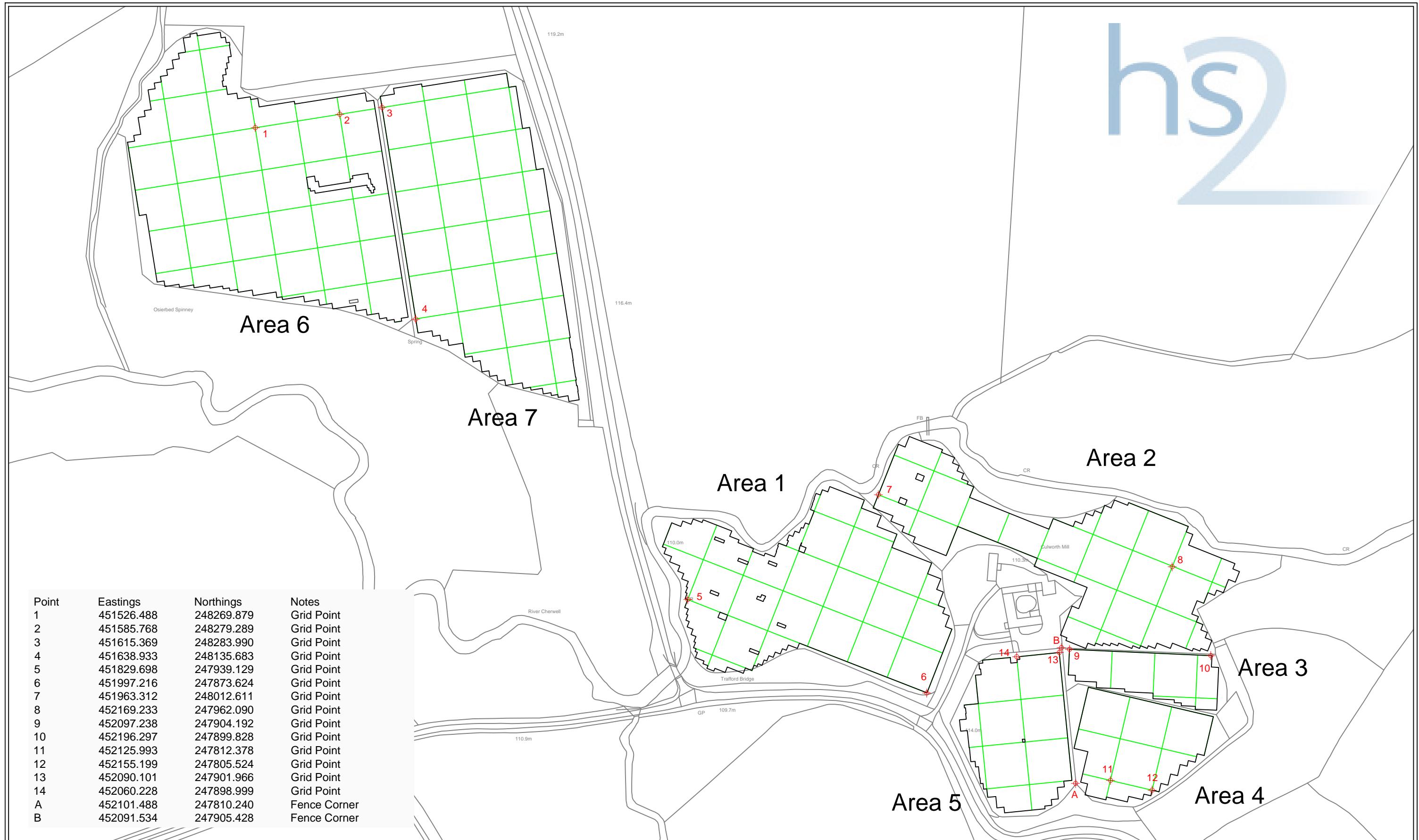
**Project:** G1317/7 HS2: C252 Country South  
CFA15 Trafford Bridge CW0AA

**Title:** CW0AA: Magnetic Data - Area 7:  
XY Trace Plot & Greyscale Plot

Drawn by: ELWood

**CH-004-15.45**

hs2

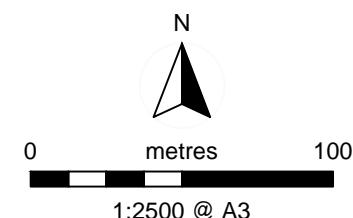


**GSB**

PROSPECTION Ltd

GSB Prospection Ltd  
Cowburn Farm, 21 Market Street  
Thornton, Bradford, BD13 3HW

+44 (0)1274 835016



The above GPS points are raw RTK co-ordinates. If re-establishing the grid or setting out trenches, please use points A-B for reference.



Selected GPS Point



30m Grid Division

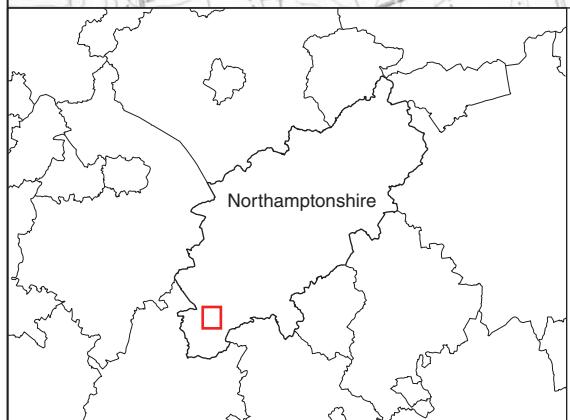
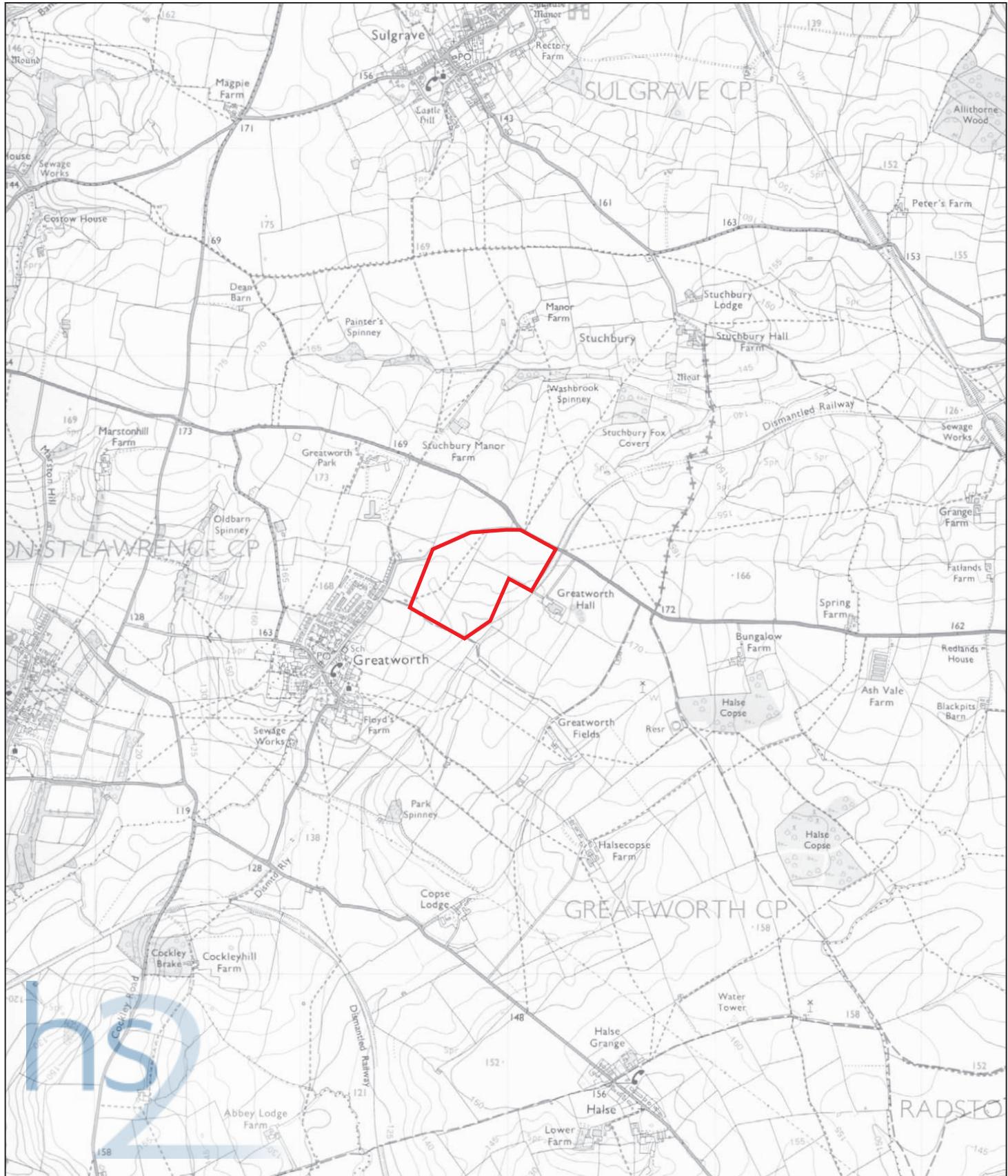
Project: G1317/7 HS2: C252 Country South  
CFA15 Trafford Bridge CW0AA

Title: CW0AA: Tie-in Information

Based on the Ordnance Survey Map provided by the client. Reproduced with the permission of the Controller of HMSO © Crown Copyright (AL100018665)

Drawn by: ELWood

CH-004-15.46



Reproduced from the 2000 Ordnance Survey Explorer map with the permission of Ordnance Survey on behalf of The Controller of Her Majesty's Stationery Office © Crown copyright  
Cotswold Archaeology Ltd 100002109



Cirencester 01285 771022  
Milton Keynes 01908 218320  
Andover 01264 326549  
[www.cotswoldarchaeology.co.uk](http://www.cotswoldarchaeology.co.uk)  
[enquiries@cotswoldarchaeology.co.uk](mailto:enquiries@cotswoldarchaeology.co.uk)

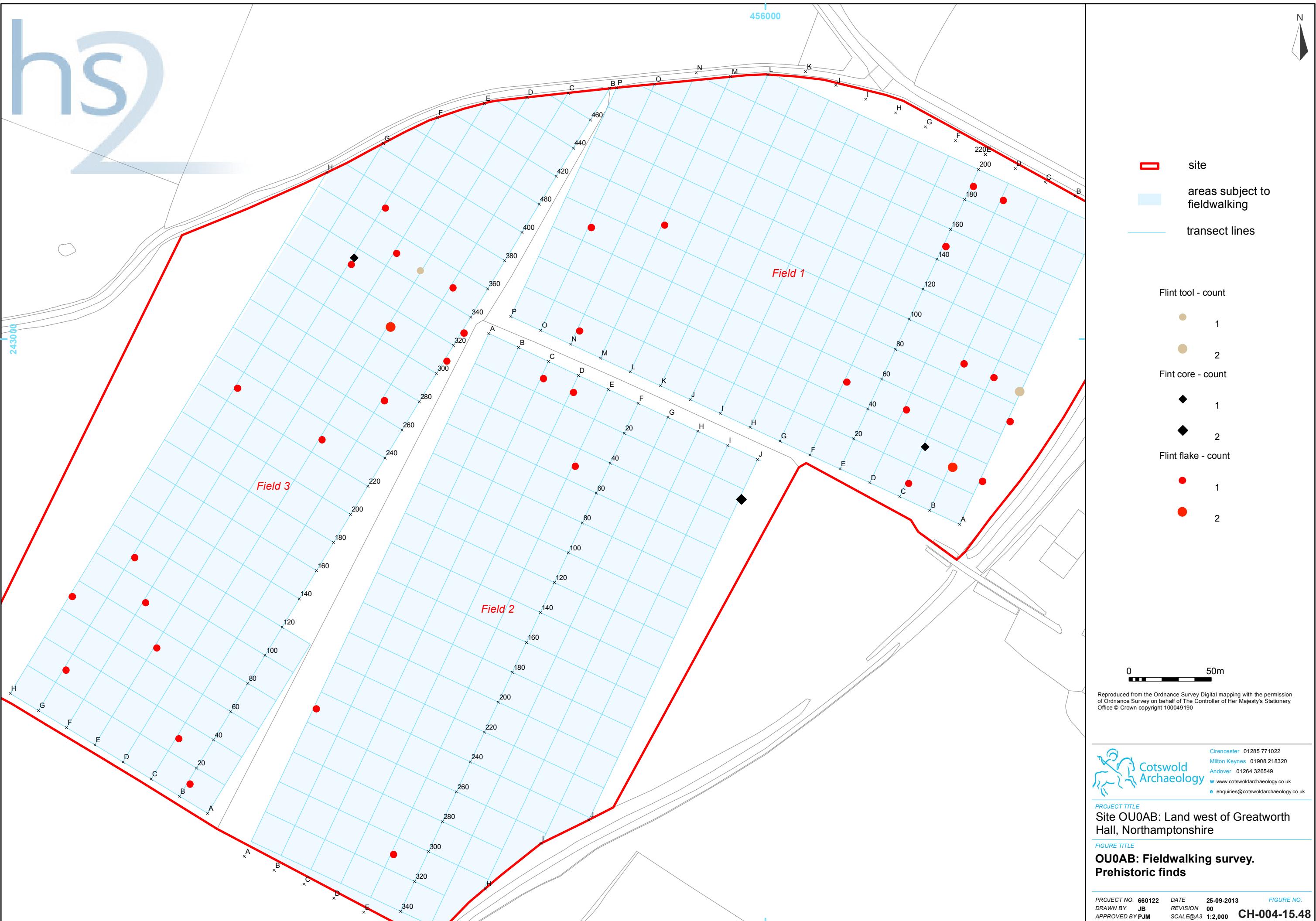
**PROJECT TITLE**  
Site OU0AB: Land west of Greatworth Hall, Northamptonshire

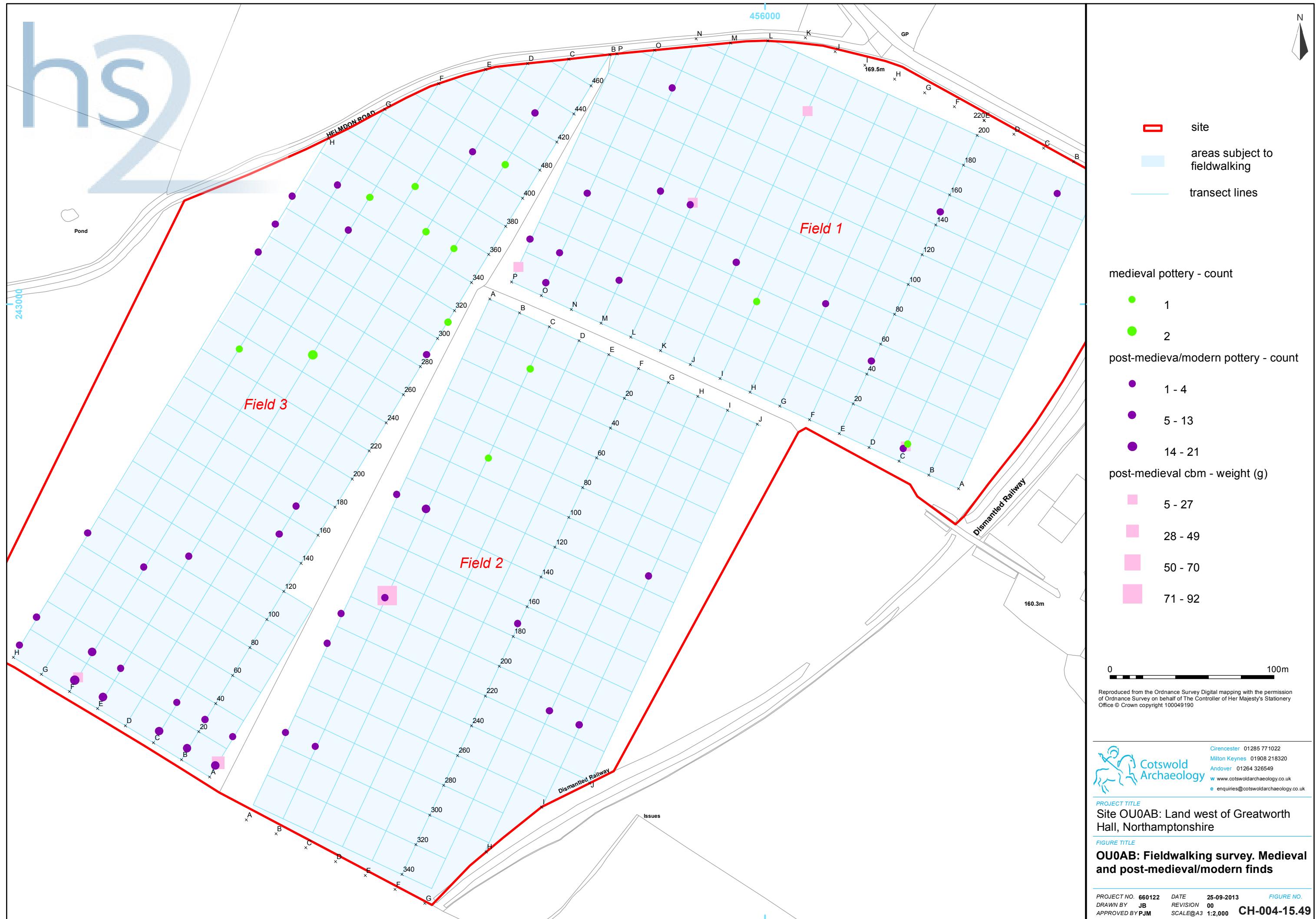
**FIGURE TITLE**  
**OU0AB: Fieldwalking survey.  
Site location plan**

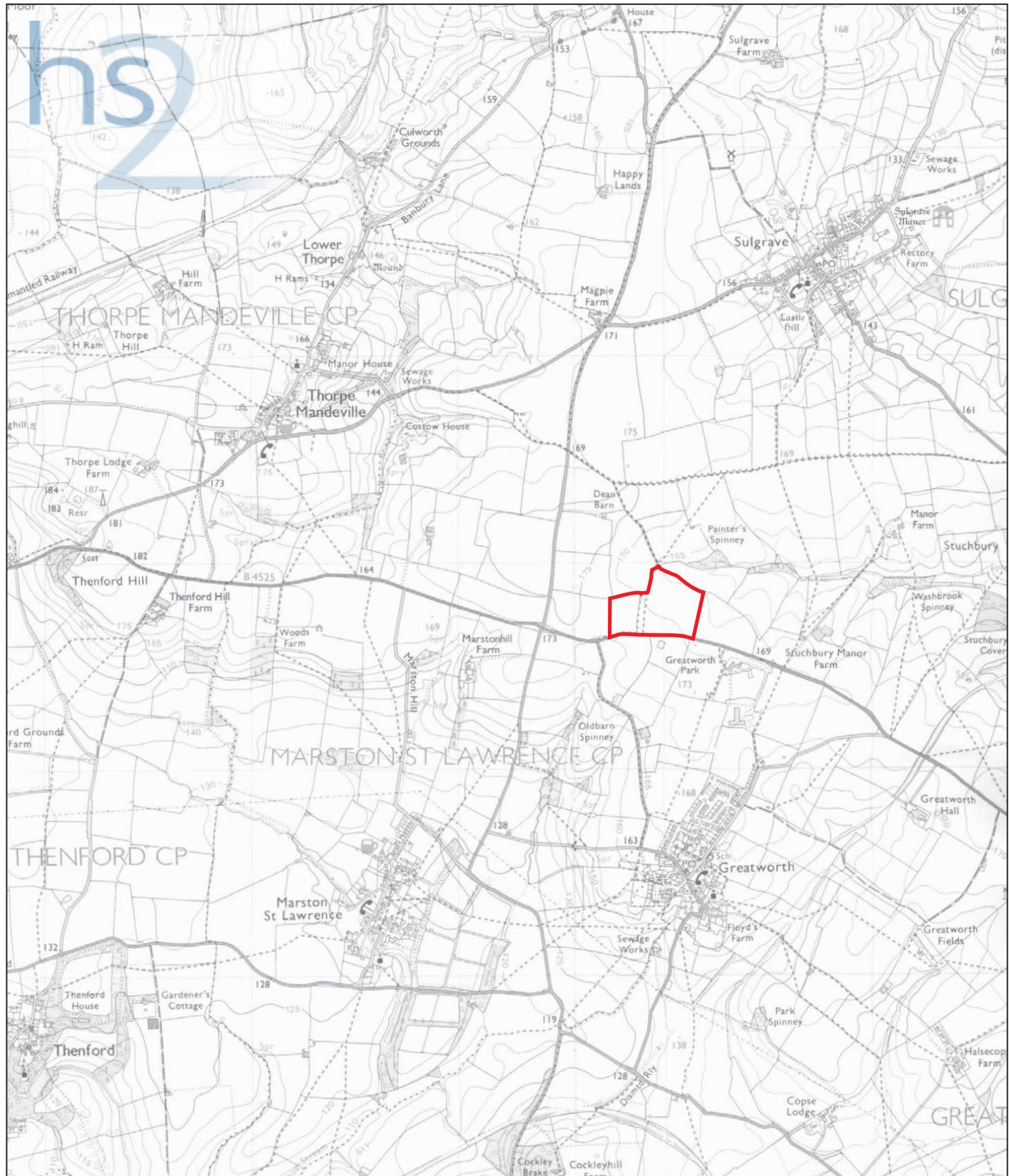
PROJECT NO. 660122 DATE 25-09-2013  
DRAWN BY JB REVISION 00  
APPROVED BY PJM SCALE @ A4 1:25,000

**FIGURE NO.**

**CH-004-15.47**







Reproduced from the 2000 Ordnance Survey Explorer map with the permission of Ordnance Survey on behalf of The Controller of Her Majesty's Stationery Office © Crown copyright  
Cotswold Archaeology Ltd 100002109



Cirencester 01285 771022  
Milton Keynes 01908 218320  
Andover 01264 326549  
w [www.cotswoldarchaeology.co.uk](http://www.cotswoldarchaeology.co.uk)  
e [enquiries@cotswoldarchaeology.co.uk](mailto:enquiries@cotswoldarchaeology.co.uk)

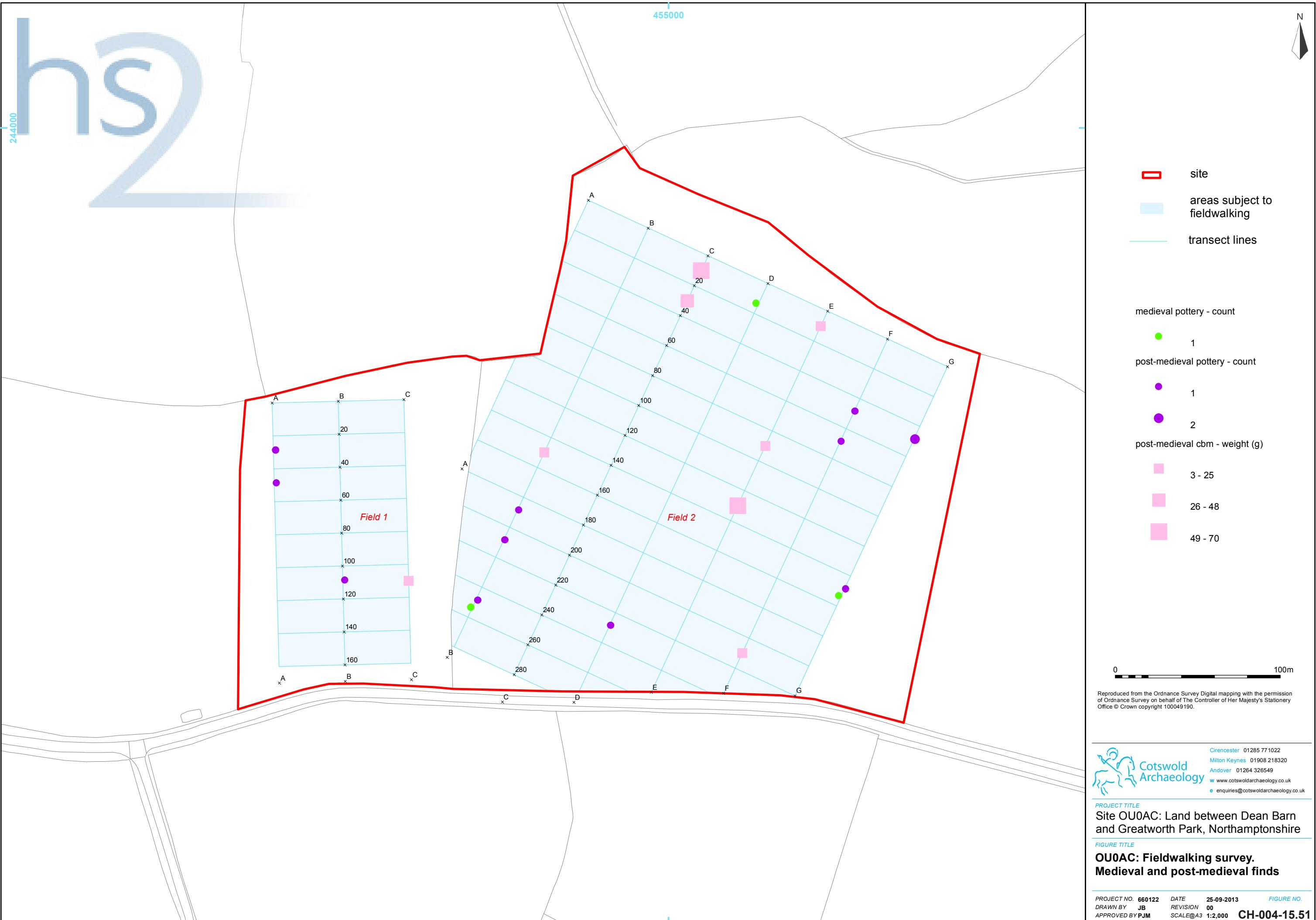
PROJECT TITLE

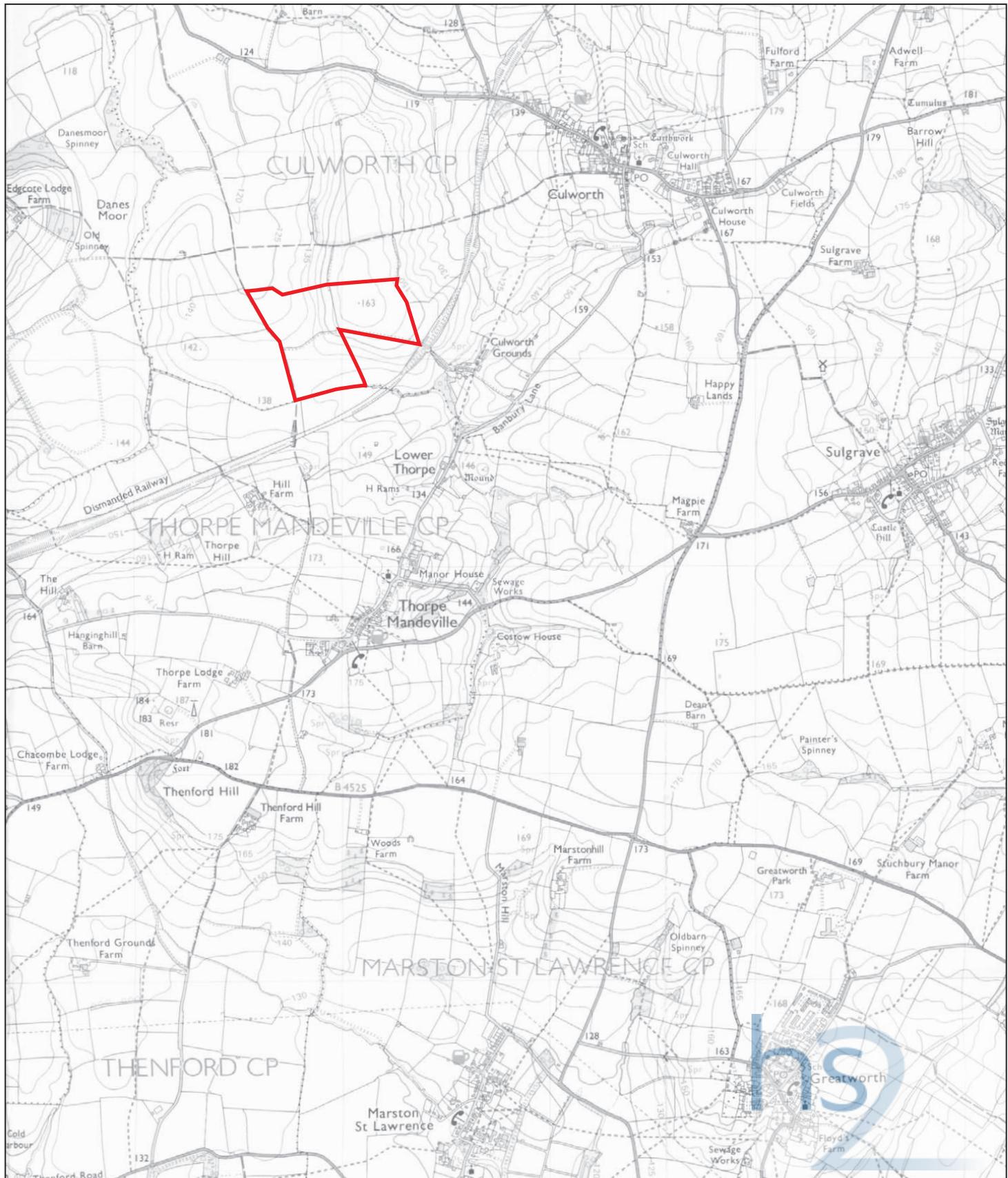
Site OU0AC: Land between Dean Barn and Greatworth Park, Northamptonshire

FIGURE TITLE

OU0AC: Fieldwalking survey.  
Site location plan

PROJECT NO. 660122 DATE 25-09-2013  
DRAWN BY JB REVISION 00  
APPROVED BY PJM SCALE @ A4 1:25,000 FIGURE NO. CH-004-15.50





Reproduced from the 2000 Ordnance Survey Explorer map with the permission of Ordnance Survey on behalf of The Controller of Her Majesty's Stationery Office © Crown copyright  
Cotswold Archaeology Ltd 100002109



Cirencester 01285 771022  
Milton Keynes 01908 218320  
Andover 01264 326549  
w [www.cotswoldarchaeology.co.uk](http://www.cotswoldarchaeology.co.uk)  
e [enquiries@cotswoldarchaeology.co.uk](mailto:enquiries@cotswoldarchaeology.co.uk)

PROJECT TITLE

Site CH0AB: Land west of Culworth Grounds Farm, Northamptonshire

FIGURE TITLE

CH0AB: Fieldwalking survey.  
Site location plan

|             |        |            |            |              |
|-------------|--------|------------|------------|--------------|
| PROJECT NO. | 660122 | DATE       | 25-09-2013 | FIGURE NO.   |
| DRAWN BY    | JB     | REVISION   | 00         |              |
| APPROVED BY | PJM    | SCALE @ A4 | 1:25,000   | CH-004-15.52 |

